DOCUMENT RESUME

ED 224 631 RC 013 685

AUTHOR	Shepard, Gary; Costello, Bill
TITLE	STARS (Secondary Training for Alaskan Rural Students): Science. Draft Copy.
INSTITUTION	Kodiak Island Borough School District, Alaska.
SPONS AGENCY	Alaska State Dept. of Education, Juneau.
PUB DATE	Aug 77
NOTE	245p.; For related documents, see ED 180 679, and RC 013 686-687. Parts may be marginally legible.
PUB TYPE	Guides - Classroom Use - Materials (For Learner) (051)
EDRS PRICE	MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS	*Alaska Natives; Answer Keys; *Biology; First Aid; Grade 9; Grade 10; High Schools; Human Body; *Instructional Materials; Mechanics (Process); *Rural Education; *Sciences; Teacher Developed Materials; Vocabulary Development; Weather; Workbooks
IDENTIFIERS	*Alaska (Kodiak Island); *Secondary Training for Alaskan Rural Students

ABSTRACT

STARS (Secondary Training for Alaskan Rural Students) materials resulted from extensive rewriting of the Vocational Adult Secondary Training (VAST) materials produced by the British Columbia Department of Education, after those materials had been used with the 9th and 10th graders on Kodiak Island. Revision was done by teachers who had been using the materials and by an experienced Alaskan curriculum materials consultant, and was done specifically for rural Alaskan students. The units are designed so that the average 9th or 10th grader should usually complete all materials in 1 year. The STARS "Science" student workbook covers four units, consisting of human biology, first aid, weather, and simple machines. For each unit there are reading selections, supplemental aids, and activities. A unit test is provided at the end of each unit. Additional reading assignments are made from other reference sources. Answer keys are supplied for the exercises and for the unit tests. (BDR)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED224631

STARS

(SECONDARY TRAINING FOR ALASKAN RURAL STUDENTS)

SCIENCE

DRAFT COPY

BEST COPY AVAILABLE

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY Thomas G. Wischer TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

AUTHORS:

GARY SHEPARD

BILL COSTELLO

CONSULTANT:

LUCILLE FREY

PROJECT MANAGEMENT:

MIKE JOHNSON

LAYOUT ARTIST:

VIRGINIA JERREMS

AUGUST, 1977

KODIAK ISLAND BOROUGH SCHOOL DISTRICT

PUBLISHED AND PRINTED WITH BLOCK GRANT FUNDS MADE AVAILABLE BY THE ALASKA STATE DEPARTMENT OF EDUCATION.

RC 01 3685

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.
✓ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

FOREWORD

In 1975, the Kodiak Island Brough School District purchased and used the VOCATIONAL ADULT SECONDARY TRAINING (VAST) materials from the British Columbia Department of Education. In 1976, these materials were also used with the 9th and 10th grade students on Kodiak Island. An extensive evaluation of the materials was done which concluded that certain parts and sections of these materials needed revision to fit rural Alaskan students. Therefore, a team of writers was put together to rewrite these materials into the form in this book.

The writing team consisted of teachers who had been using the materials and an experienced Alaskan curriculum materials consultant. The team worked for over two weeks and revised the materials extensively. However, they concluded that this 1977 copy should be re-evaluated during the 1977-78 school year and revised again in the summer of 1978. Therefore this copy is labeled DRAFT COPY.

Considerations & Recommendations

1) These materials have been rewritten and revised specifically for rural Alaskan students.

2) This is a DRAFT COPY which will be revised again 1978.

3) These materials were written for 9th and 10th grade students, but can be used with other groups where appropriate.

4) Teachers should note that these materials:

(a) Require individualization and accompanying scheduling, classroom organization, and teaching style considerations;

(b) Require a student to take more responsibility for his/her own education and care must be taken to train teachers and students how to use them;

(c) Have been used with 8th grade students, but only about 50% have developed the maturity to work with them consistantly and effectively;

(d) Are designed so that the average 9th grader should usually complete 1/2 of the materials in one year, and 10th graders all of the materials (except for Science, which is a shorter unit);

(e) Have errors, faults, and imperfections, but are the best method the rural Alaskan teachers who have used them, feel there is available.

5) More complete information on these materials and the program designed and implemented to use them is available from the Kodiak Island Borough School District. (See 'Acknowledgements')

ACKNOWLEDGEMENTS

This book contains a great deal of the material developed in the *VOCATIONAL ADULT SECONDARY TRAINING (VAST)* materials distributed by the British Columbia Department of Education. Without the hard work of the British Columbia teachers who put the VAST materials together and Karl Osmers' assistance, the *STARS* materials would not have been possible. We would like to thank the British Columbia Department of Education for graciously letting us use their materials in our writing of *STARS*.

We would also like to thank the Alaska State Department of Education for providing us with the assistance and financial resources we needed to implement our *SMALL RURAL SCHOOLS PROJECT* and produce these materials.

This book would really not have been possible though, without the help of some of the finest teachers in Alaska who spent so many hours writing this material:

AUTHORS:

COMMUNICATIONS:	ELAINE GRIFFIN KATHLEEN OPEL
MATH:	NED GRIFFIN ROBERT OSTROM
SCIENCE:	GARY SHEPPARD BILL COSTELLO
OVERALL CONSULTANT:	LUCILLE FREY

I truly appreciate the opportunity to have worked with such a fine group of dedicated, creative, and knowledgeable professionals. Additionally, the secretaries and layout artist, Virginia Jerrems, also proved invaluable.

Finally, another group of people who really deserves acknowledgement as well:

The Kodiak Island School Board, the Administration, and in particular, Superintendent Robert C. Greene. Without their planning, assistance, direction, knowledge, and support, none of this would have been possible from the very beginning.

Sincerely,

MIKE JOHNSON
Rural Schools Project Coordinator

INTRODUCTION

The STARS Science Program, that you will use, covers four units. They consist of HUMAN BIOLOGY, FIRST AID, WEATHER, and SIMPLE MACHINES. In each unit there are reading selections, supplemental aids, and activities. A unit test will be given after you have completed each unit.

Please feel free to check with your teacher if you need additional help with any of the materials covered.

STARS

SECONDARY
TRAINING FOR
ALASKAN
RURAL ★
STUDENTS

KODIAK BOROUGH SCHOOLS

SCIENCE

TABLE OF CONTENTS

UNIT 1:

HUMAN BIOLOGY

A. The Living Cell
B. Skeletal System
C. Muscular System
D. Respiratory System
E. Digestive System
F. Circulatory System
G. Urinary System
H. Nervous System
I. Endocrine System
J. Sense Organs
K. Reproductive System
L. The Body Bank Game
M. Glossary of Terms

UNIT 2:

FIRST AID

A. Wounds
B. Shock
C. Artifical Respiration
D. Burns
E. Fire Prevention
F. Poison
G. Outdoor Survival
H. Highway Safety
I. Activities Section

UNIT 3:

WEATHER

A. Weather Lore
B. Atmosphere
C. Front & Masses
D. Wind
E. Weather Forecasting
F. Activities Section

UNIT 4:

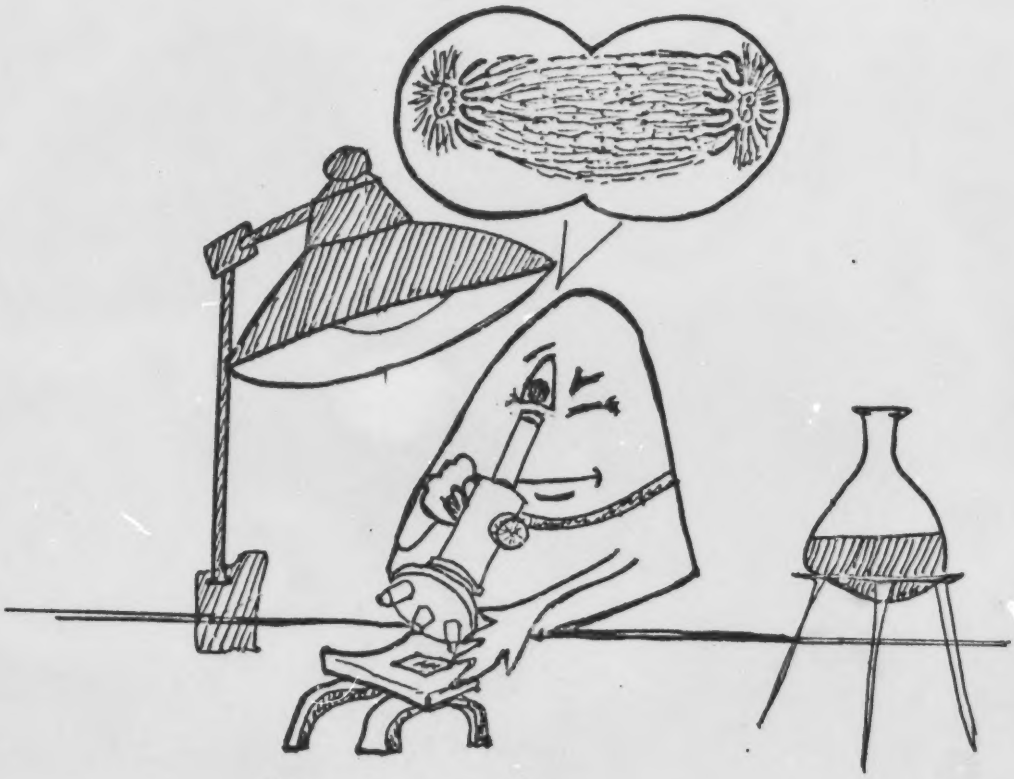
SIMPLE MACHINES

A. Inclined Plane
B. Levers
C. Wheels & Axles
D. Pulleys
E. Wedge & Screw
F. Gears

UNIT 1.

HUMAN BIOLOGY

A. THE LIVING CELL

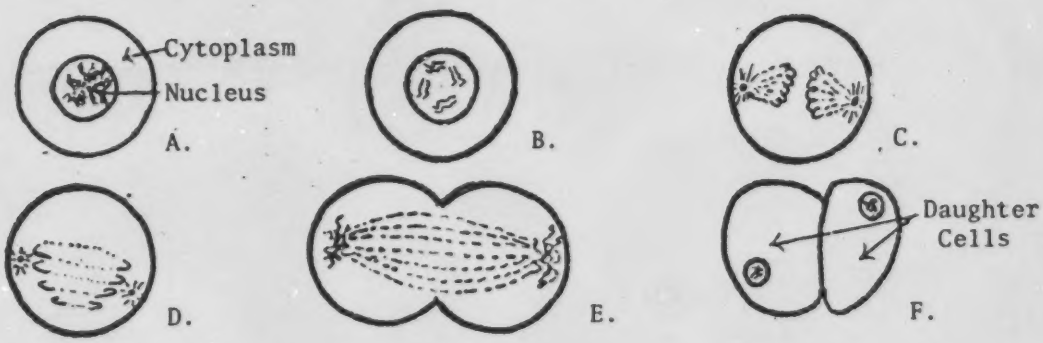


THE LIVING CELL

Objective 1

THE STUDENT WILL IDENTIFY THE CELL AS THE BASIC UNIT OF ALL LIVING THINGS.

DIAGRAM OF CELL DIVISION



All living things are made up of basic units called *cells*. They are so tiny that they can't be seen except with powerful microscopes. They are so small that, if they were laid end to end, it would take from 300 to 3000 of them to stretch an inch. The outside skin of a cell is called the *cell wall* in a plant and the *cell membrane* in an animal.

The *nucleus* of the cell is its "control center". Inside the nucleus are *chromosomes*. They are made of special kinds of body acids called DNA and RNA, molecules that carry all the information needed to run the cell, something like a piece of tape in a tape recorder. For instance, the DNA molecules determines if the cells, as they grow and reproduce, will build a butterfly or an oak tree or a person. The jelly like matter inside each cell is called *cytoplasm*.

LEARN TO USE A MICROSCOPE. You will find excellent instructions in *THE INVISIBLE WORLD,* pp. 131 - 134.

DO THE Animal Cell Activity ON PAGE 143, 144, OF THE SAME BOOK. It calls for scraping some cells from the inside of the mouth and looking at them through a microscope.

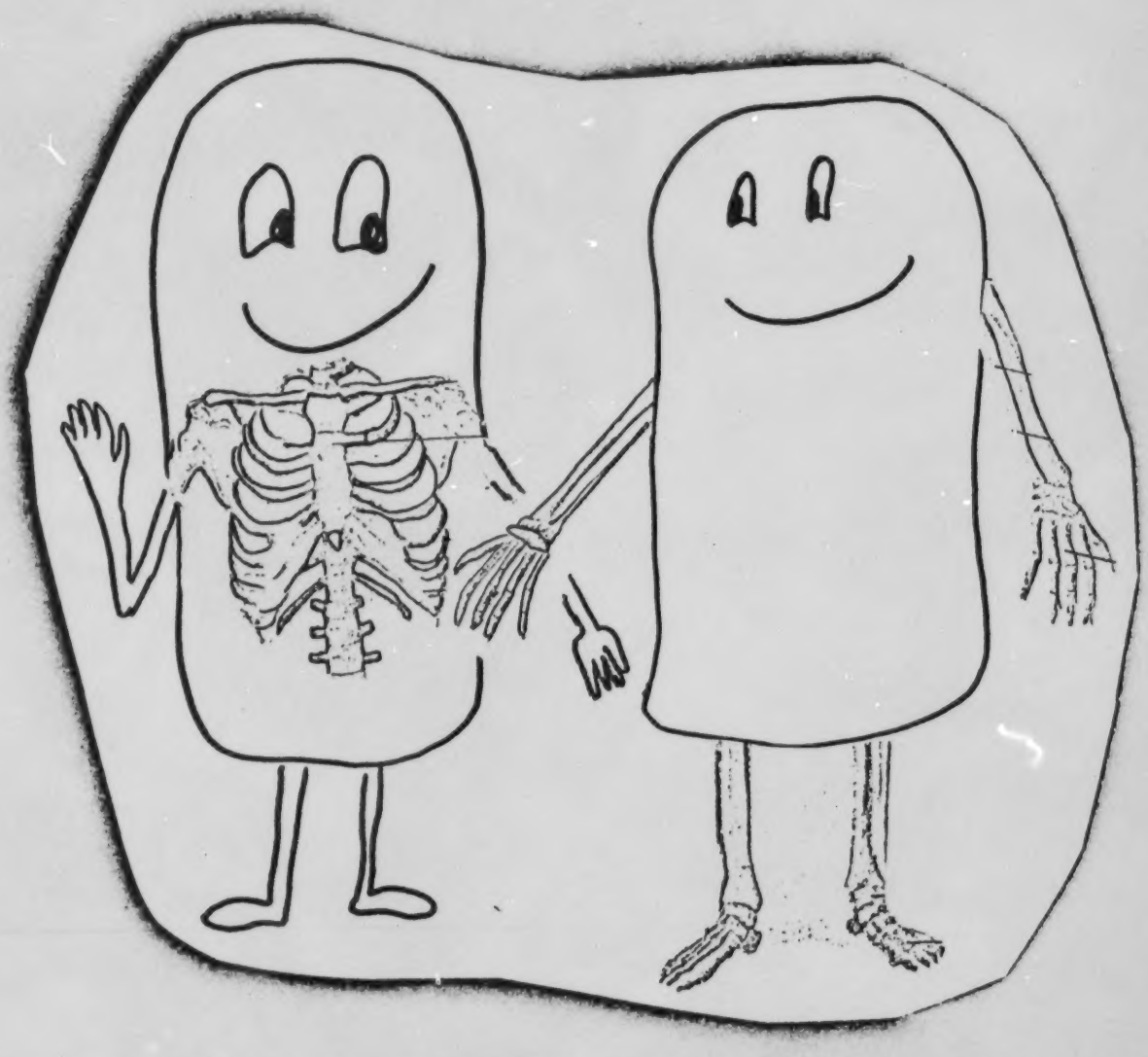
IN the Micro Slide, set no. 10 LOOK AT THE 8 KINDS OF BODY CELLS PICTURED.

DRAW YOUR OWN DIAGRAM OF A CELL, LABELLING THE NUCLEUS, CYTOPLASM AND CELL MEMBRANE.

TISSUES AND ORGANS

Inside our bodies, cell division produces numbers of cells that all specialize, or do the same thing. These cells are joined together into *tissue*. The cells in a tissue all do the same kind of work. The brain, for instance is make up of nerve cells. Muscle tissue has cells that contract when they are stimulated by the nervous system.

The body tissues, in turn are grouped together to do more complex jobs. These groups are called *organs*. The heart is a body organ whose job it is to circulate the blood. The lungs are an organ which process oxygen. Organs join with other organs to form *systems*. The heart and blood vessels are a part of the *circulatory system*. The lungs are a part of the *respiratory system*. These are but two of the body systems you will study in this unit.



B.

SKELETAL SYSTEM

UNIT I: HUMAN BIOLOGY

TOPIC B: SKELETAL SYSTEM

OBJECTIVES:

1. IDENTIFY THE RELATIONSHIP BETWEEN TISSUES, ORGANS, AND SYSTEMS.

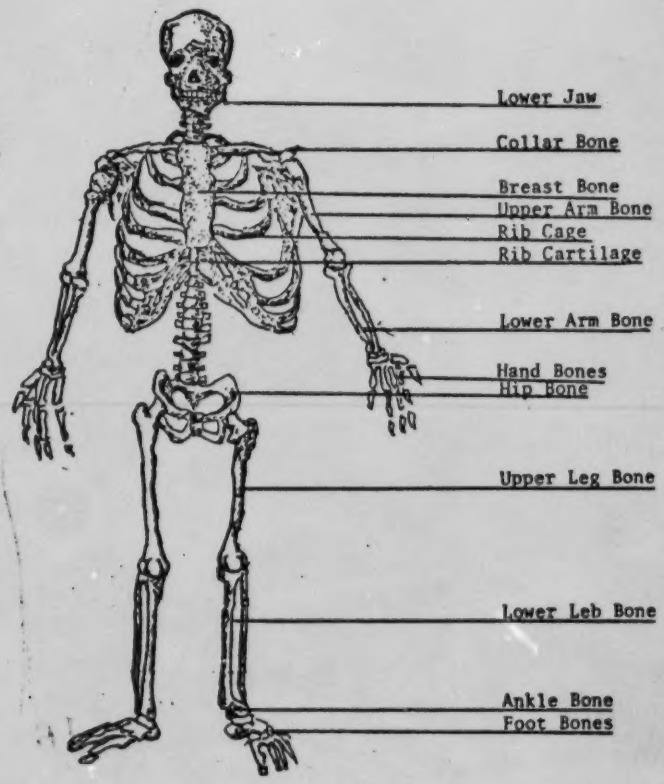
2. TO UNDERSTAND THE FUNCTIONS OF THE SKELETAL SYSTEM.

Your body is made up of more than 200 bones. These bones make up your body structure which is called the skeleton. The skeleton is the framework for your body.

Your bones help to support the body. Bones also make it possible for you to move about. In addition, bones protect and support your heart, lungs, and other organs.

Bones are joined to other bones at a joint. Tough elastic bonds of tissue called ligaments connect the bones at the joints. These joints can move easily because they are lined with layers of cartilage which protects bones against damage from bumps.

The picture (right) shows a good frontal view of the human skeleton and its parts.



READ - Spies, You & Me UNIT 7 p. 81-87

Read - Handbook of Basic Science page 235-238
Read - Spies, You & Me, The Framework of the Body page 81-87

Supplemental Aids

Audio-Visual
KFS 61 "The Skeletal System", filmstrip #8 in kit.
(May obtain at Kodiak IMC)

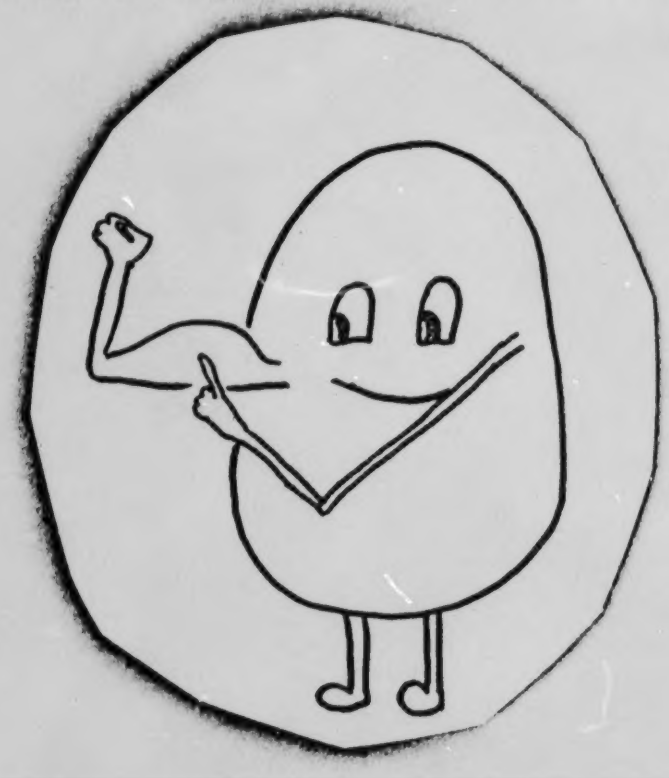
Filmstrips-Human Physiology Series, Sve-Singer

Activities

Make a simple diagram of the human skeleton and label it. You may use your textbook, filmstrips, or other class reference materials to help in making your drawing.

C.

MUSCLE



SYSTEM

UNIT 1: HUMAN BIOLOGY

TOPIC C: THE MUSCULAR SYSTEM

OBJECTIVES: 1) Identify the relationship between tissues, organs, and systems.

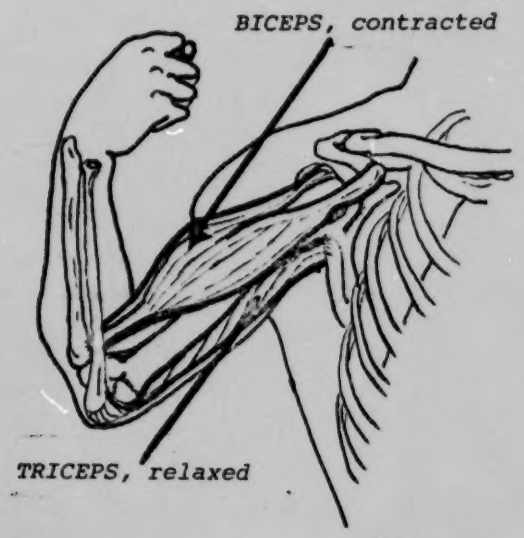
2) To understand the basic structure of the muscular system.

Muscles can be found throughout your body. For example, your heart, chest, arms, and legs all contain muscles.

Usually muscles work in pairs. When one muscle of a pair pulls or contracts, the other muscle must relax or stop pulling. (See illustration #2) To obtain motion in the other direction, the action of the two muscles is reversed.

There are *voluntary* muscles and *involuntary* muscles. Voluntary muscles are muscles you control. In other words, you tell these muscles what to do. There are about 600 or more voluntary muscles. These muscles work together to maintain posture, and to move legs, lips, eyes, and other parts of the body.

Involuntary muscles are muscles you cannot control. For example, you cannot control your heart muscles. They are always working whether you are asleep or awake. Involuntary muscles are also found in such organs as the intestines and the stomach.



The illustration above is a good example of voluntary muscles working together. The biceps and the triceps of the upper arm form a pair. When the arm bends at the elbow, the biceps contracts and the triceps relaxes.

Read--Handbook of Basic Science pp. 239-242

Supplemental Aids

Audio-Visual

KFS 61-Filmstrip #7 (Kodiak IMC)

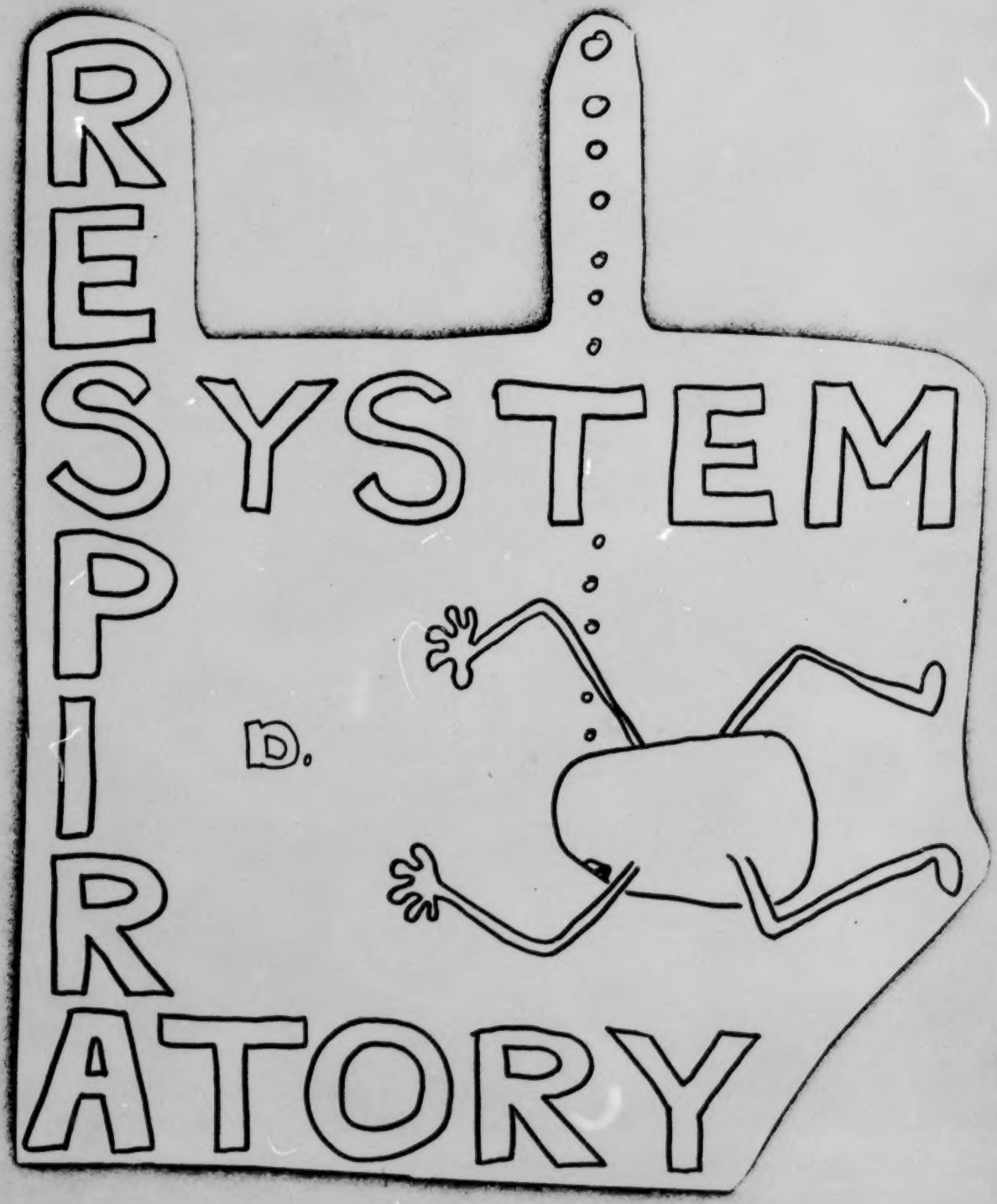
FS 310-The Body Machine - Muscular System (Kodiak IMC)

FS - Human Physiology Series - Sve-Singer

Activities

Using filmstrips or illustrations from other class reference materials, make an outline drawing of the human body and locate the following muscles on the drawing.

shoulder muscle (deltoid)
abdominal muscle
biceps muscle
triceps muscle
rib muscle
back muscle
trunk muscle


RESPIRATORY
SYSTEM
D.

UNIT 1: HUMAN BIOLOGY

TOPIC D: THE RESPIRATORY SYSTEM

OBJECTIVES: 1) Identify the relationship between tissues, organs, and systems.
2) To understand how the respiratory or breathing system works.

In order to stay alive you must breathe in *oxygen* which is present in the air. Your *respiratory* or *breathing system* allows air containing oxygen to move into your nose or mouth. At the same time *carbon dioxide* and other waste leave the body by the same route. This is known as breathing. To understand this breathing *process* a step method is listed below:

Step 1: *Air comes in and enters a filter system to get rid of dust particles and other bacteria.*

Step 2: *Filtering takes place in the nasal passages and the trachea or windpipe.*

Step 3: *Clean air then travels along to the lungs through two tubes called bronchial tubes.*

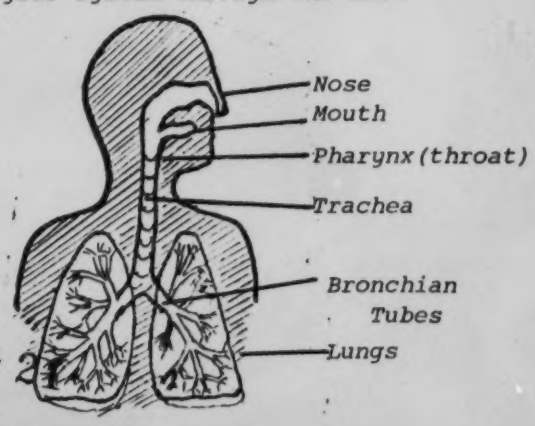
Step 4: *The air finally reaches tiny, thin-walled air sacs. As you breathe these sacs fill with air.*

Step 5: *The oxygen in the air passes through the thin walls of the sacs into a system of capillaries. In the capillaries, hemoglobin in red blood cells picks up the oxygen.*

Step 6: *The blood carries this oxygen to all the cells of your body. This oxygen is necessary for the 'burning' of food within the cells. This process is known as oxidation. During oxidation energy is given off. We need this energy to do many of our daily activities.*

Step 7: *Oxidation also produces the waste product carbon dioxide which is carried back to the lungs by the blood. Eventually this carbon dioxide will pass out of your system through the nose or the mouth as you breathe out.*

A simple illustration of parts of the respiratory system is shown in the figure at right.



Read - Handbook of Basic Science pp. 250-253

Supplemental Aids

Kit 906 - Breathing Man Model (IMC Kodiak)

Microslides No. 72 - Respiratory System

Microslides No. 112 - Your LIfe and Breath
(National Teaching Aids Series)

Filmstrips - Human Physiology Series, Sve-Singer

Activities #1

Making a Breathing Model

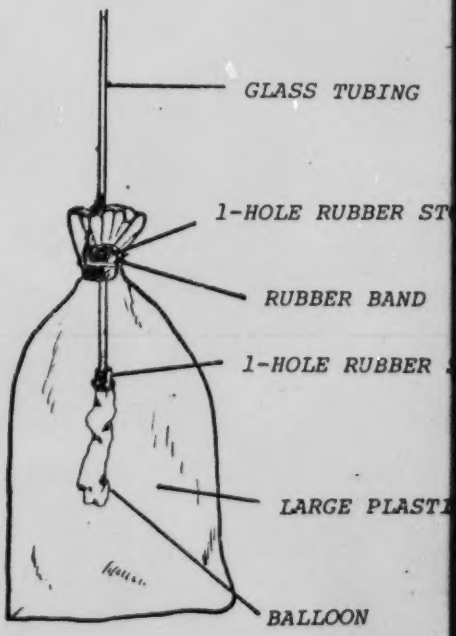
Materials

2 one-hole rubber stoppers
30-50 cm glass tubing
1 small balloon
1 rubber band
1 large plastic bag

May be obtained from IMC - Concepts in Science Lab Kit Units 5 and 6

Procedure:

Set up materials as shown in figure #4. First squeeze the bag. Then pull the sides of the bag to increase its volume.



Questions you might ask or answer

1. What happens to the balloon when the bag is squeezed?

2. What happens to the balloon when the volume of the bag is increased?

3. What parts of the body do the following resemble?

   a. tube
   b. plastic bag
   c. balloon
   d. force of your hands

Activity #2

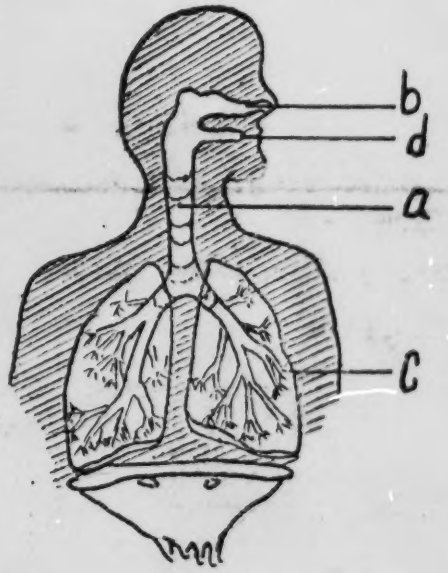
The pictures below show the organ system. The organs of the respiratory system are listed next to each picture. In the space next to each organ name, write the correct letter from the picture.

_____ LUNGS

_____ WIND PIPE

_____ MOUTH

_____ NOSE



RESPIRATORY SYSTEM

Activity #3

Read - Spies - You and Me Learning Activity Unit 2 and do one or more of the investigations. pp. 15-29. (Check with teacher to see if you have the following materials first.)

DIGESTIV

E.

SYSTEM

UNIT 1: HUMAN BIOLOGY

TOPIC E: DIGESTIVE SYSTEM

OBJECTIVES: 1) Identify the relationship between tissues, organs, and systems.

2) To understand the functions of the digestive system.

Your digestive system is an organ system. Some of the most important organs of the digestive system are the mouth, food pipe, stomach, large and small intestines. To understand what they do let's take an imaginary trip through the digestive tract.

The previous numbered pa
the original document was bl

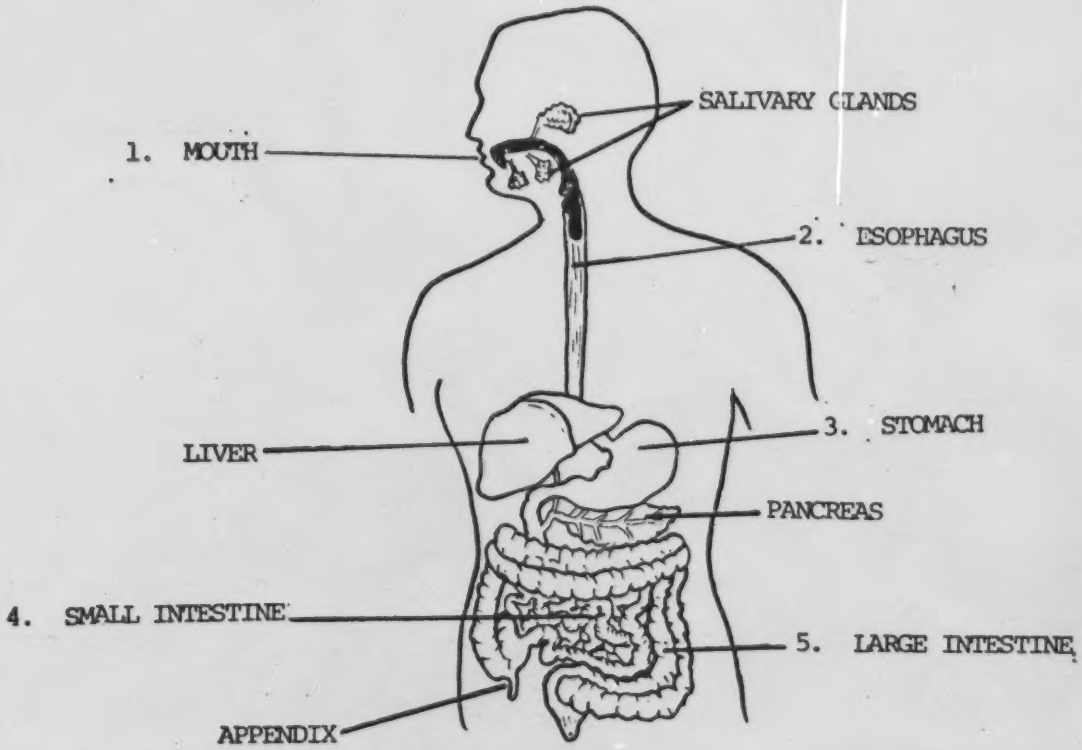
As food enters your mouth, your teeth begin their job of chewing it into small pieces. Saliva from your salivary glands also help by breaking down the food by moistening it. The food is swallowed and goes down the esophagus or food tube to the stomach. The stomach contains digestive juices which help in mixing up the food. The stomach also serves as a storage area for food.

Food stays in the stomach for 3 to 5 hours. After that time period, the stomach releases the food to the small intestine. The small intestine carries on most of the chemical digestion of food by releasing digestive juices onto the food.

The pancreas and liver also aid in digestion. The pancreas gland empties several secretions into the small intestine to aid digestion. The liver makes a digestive juice and helps the body use food.

Food which can be used by your body passes through the walls of the small intestine. It enters the blood which carries it to the cells. Any food which is not usable enters the large intestine. Most of the material that reaches the large intestine cannot be used by your body. This unusable food passes out of the body by your bowel movement.

You may want to trace the simple steps in digestion by looking at illustration #4 and following the numbers.



DIGESTIVE SYSTEM

READ - HANDBOOK OF BASIC SCIENCE, papes 255 - 257

SUPPLEMENTAL AIDS:

Filmstrip: HUMAN PHYSIOLOGY SERIES , SVE - SINGER
Microslides: NO. 67, NATIONAL TEACHING AIDS

ACTIVITIES:

1. SPIES - YOU & ME, Learning Activities Unit #6
   Investigations #1-2, pages 73 - 79.

2. ACTION BIOLOGY - Saliva Activity, pages 103 - 106
   Intestine Activity, pages 111 - 114

3. Activity: The pictures below show some of the organs of the digestive system. Organs of this system are listed next to each picture. In the space next to each organ name, write the correct letter from the picture:

Large Intestine____

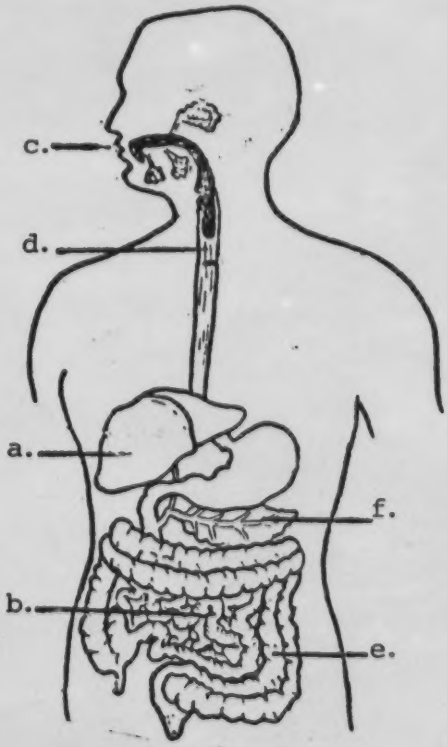
Small Intestine____

Mouth____

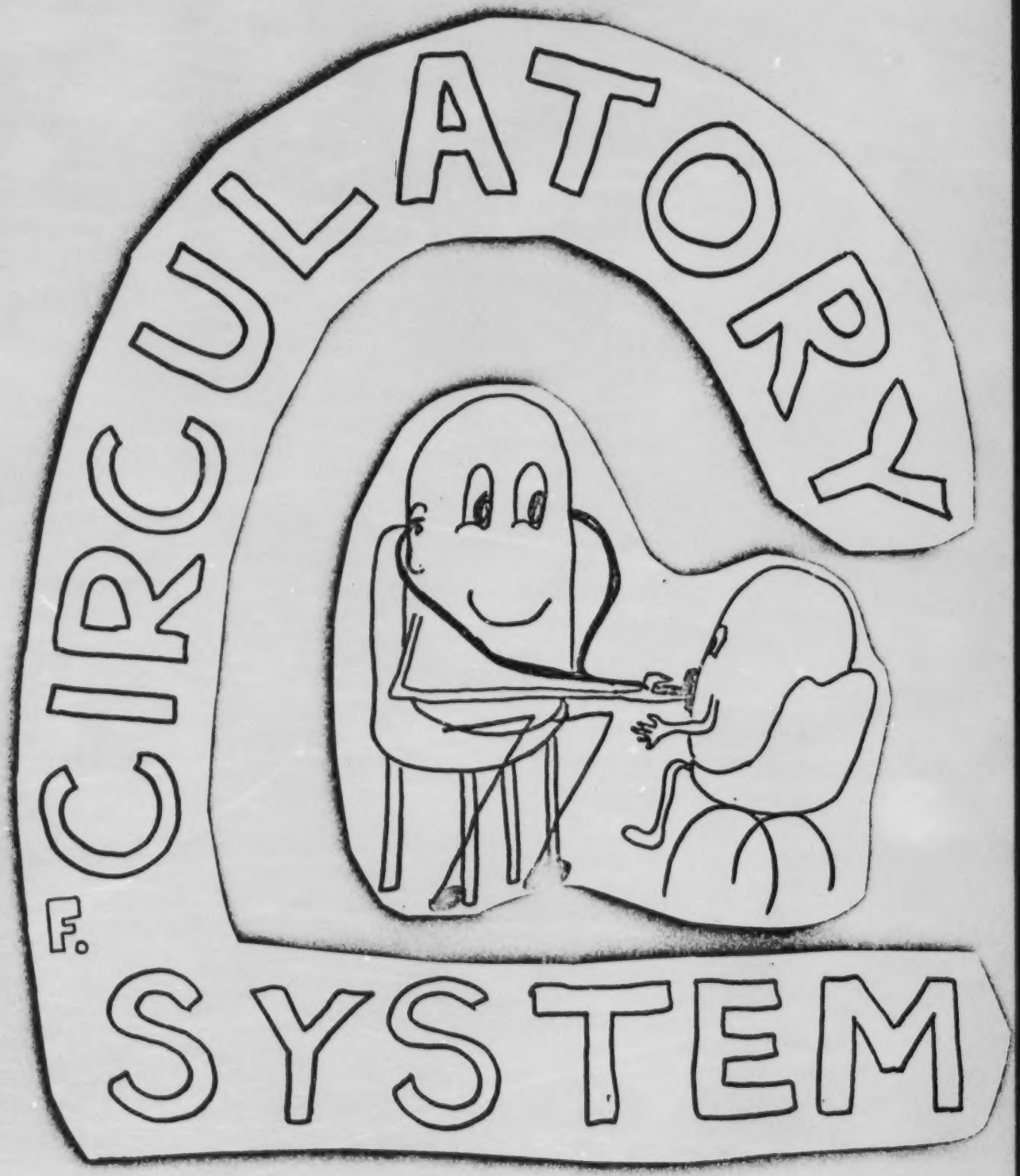
Liver (largest organ in the body)____

Pancreas____

Food Pipe____



DIGESTIVE SYSTEM


CIRCULATORY
F.
SYSTEM

OBJECTIVES

1. To develop an understanding of the role of the circulatory system.

2. To develop an understanding of the circular path of the circulatory system.

(F) The Circulatory System

The circulatory system of your body has three main parts. They are the blood vessels, the heart and the blood. The primary or main function of this system is to carry food and oxygen to the body cells and remove waste from these cells. In order to have some understanding on how this circulatory system works, let's follow the path the blood takes through your body.

When the heart contracts it sends blood from the left side of the heart to the main artery of the body called the aorta. The arteries which are blood vessels carry the blood away from the heart. When the blood reaches the smallest arteries, it travels to the capillaries. Capillaries are blood vessels that connect the end of an artery to the begining of a vein. When blood reaches the capillaries, materials brought by the blood pass through the thin capillary walls and into cells. As a result of this, energy is produced for all the activities carried on by the body.

As blood releases oxygen it takes on waste. A color change then takes place in the blood. It turns from a bright red to a dull red.

Traveling through the capillaries, the blood moves into tiny veins which merge into larger veins. This "used" blood returns to the right side of the heart through the veins. The blood continues to flow to the lungs. It manages to rid itself of waste and pick up new supplies of oxygen.

Your blood is now ready to return to the left side of the heart. Once there, it is ready to start another circular trip through your circulatory system.

Note: A detailed illustration of the circulation of the blood can be found in Action Biology, p. 32.

Read - Handbook of Basic Science, pp. 246-249

Read - Action Biology, pp. 31-36

The previous numbered page
the original document was blan

Supplemental Aids

Audio-Visual

Filmstrips - Human Physiology Series, Sve-Singer

Filmstrips 53 and 65 - Circulatory System (IMC-Kodiak)

Kits - 898 Human Heart Model (IMC Kodiak)
900 Pumping Heart Model (IMC Kodiak)

Micro-Slides #68 Circulatory System
#113 Your Circulatory System

Activities

Spies-You and Me - Investigation #1. Involves making your own working model of the heart. pp. 32-37

Action Biology - The circulation game pp. 37-38

30

G.
URINARY
SYSTEM

UNIT 1: HUMAN BIOLOGY

TOPIC G: THE URINARY SYSTEM

OBJECTIVE: To develop an understanding of the human urinary system.

Many of the waste products are removed from your body by the *urinary system*. The most important organs of the urinary system are the two *kidneys*. The kidneys act as a filter to remove urea, salt, and excess water from the blood to form *urine*.

Your kidneys produce urine all the time. This urine is stored in the *bladder*, a muscular-walled sac. When the bladder becomes full, pressure against it sends messages to the brain. *Urination* takes place and the bladder is emptied. At this point the main function of the kidneys, which is to clean the blood, has been completed.

Another job the kidneys take on is controlling the amount of water held in the body.

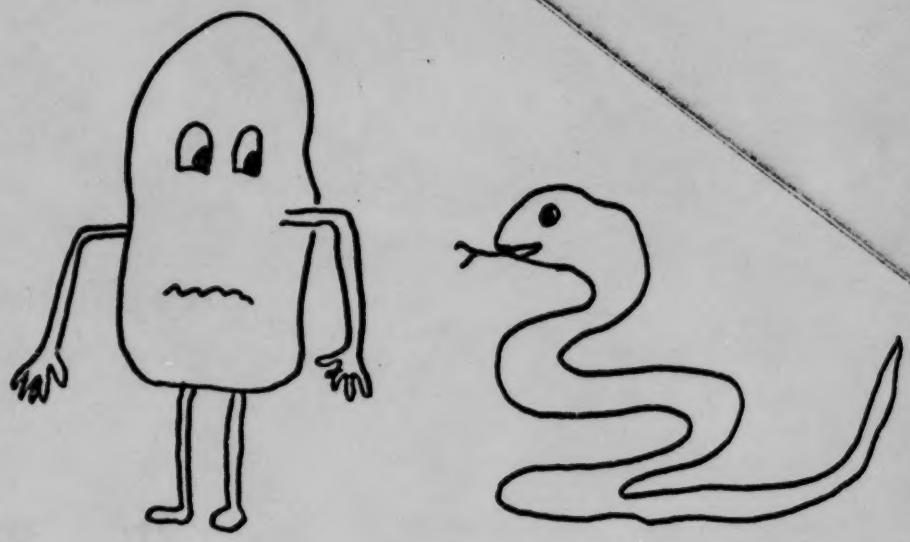
READ: ACTION BIOLOGY, pages 53 - 55

ACTIVITIES:

ACTION BIOLOGY, Urinalysis Activity pages 55 - 58

32

NERVOUS SYSTEM



H.

UNIT 1: HUMAN BIOLOGY

TOPIC H: THE NERVOUS SYSTEM

OBJECTIVES: 1) Understand the relationship between tissues, organs, and system.
2) To develop an understanding of the basic workings of the nervous system.

The nervous system is made up of two system, the *central nervous system* and a *branching nervous system*. In order to understand how each system works, let's break them down.

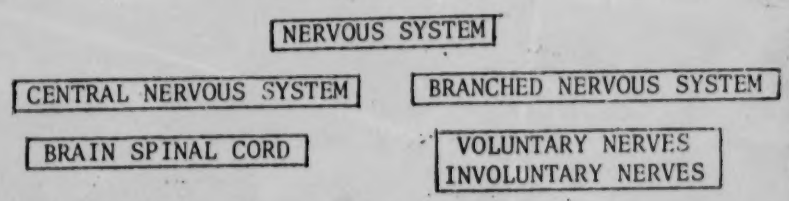
The central nervous system acts as the head command post for all nervous responses. It is made up of the *brain* and *spinal cord*.

The brain has three main parts. The largest part is the *cerebrum*. Thought, memory, and learning are controlled by the cerebrum.

The middle part of the brain is the *cerebellum*. Your balance and coordination are controlled by the cerebellum.

Below the cerebellum at the bottom of the brain is the third part called the *medulla*. It controls reflex actions, such as breathing and swallowing.

The spinal cord is also part of the central nervous system. It carries impulses into and out of the brain. In addition, the spinal cord is the exchange center for simple reflex responses. An example of a simple reflex act would be blinking.

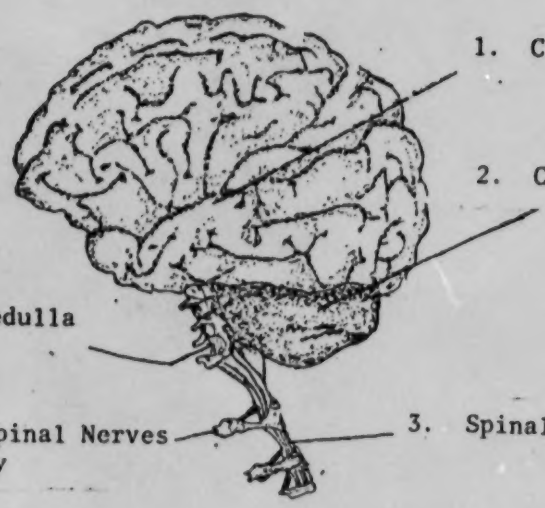


The main nervous system also contains a branched nerve system. It contains nerves which branch out like a network all over the body. Some of these nerves are voluntary and can be controlled. An example of a voluntary action would be the nerves that help you lift your arm.

Other nerves in this branched nerve system are involuntary. In other words, we have no control over them. The beating of your heart is an involuntary action.

The sample drawing above shows you a breakdown of the nervous system.

The illustration below in Figure (6) shows some of the main parts of the central nervous system.



#6

READ: HANDBOOK OF BASIC SCIENCE, pages 263 - 268 ACTION BIOLOGY, pages 283 - 284

SUPPLEMENTAL AIDS:

Audio-Visual:

Filmstrips, HUMAN PHYSIOLOGY SERIES, SVE-Singer

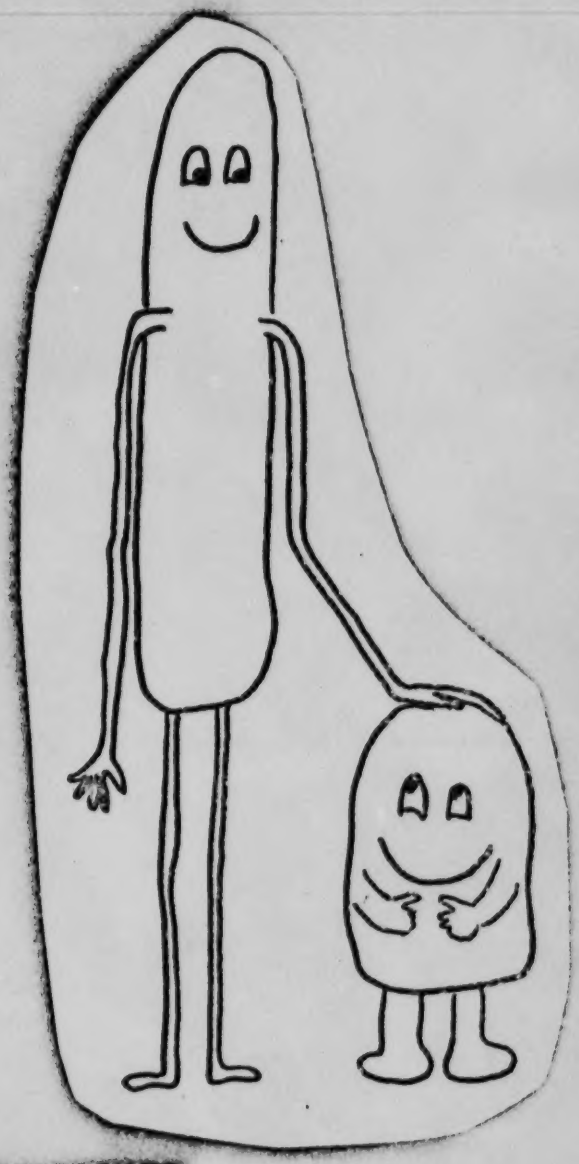
Kit #61: UNDERSTANDING YOUR BODY (IMC Kodiak)
Kit #897: HUMAN SKULL WITH BRAIN MODEL (IMC Kodiak)
Microslides #69: THE CENTRAL NERVOUS SYSTEM

ACTIVITIES:

1. Make a papier mache' model of the brain using different colors to show the various parts.

   Materials Needed: paste, newspapers, water color paints, balloons.

I. ENDOCRINE SYSTEM



OBJECTIVES

1. You will be able to identify the various glands that make up the endocrine system.

2. You will understand how the endocrine glands help regulate the growth and development of the body.

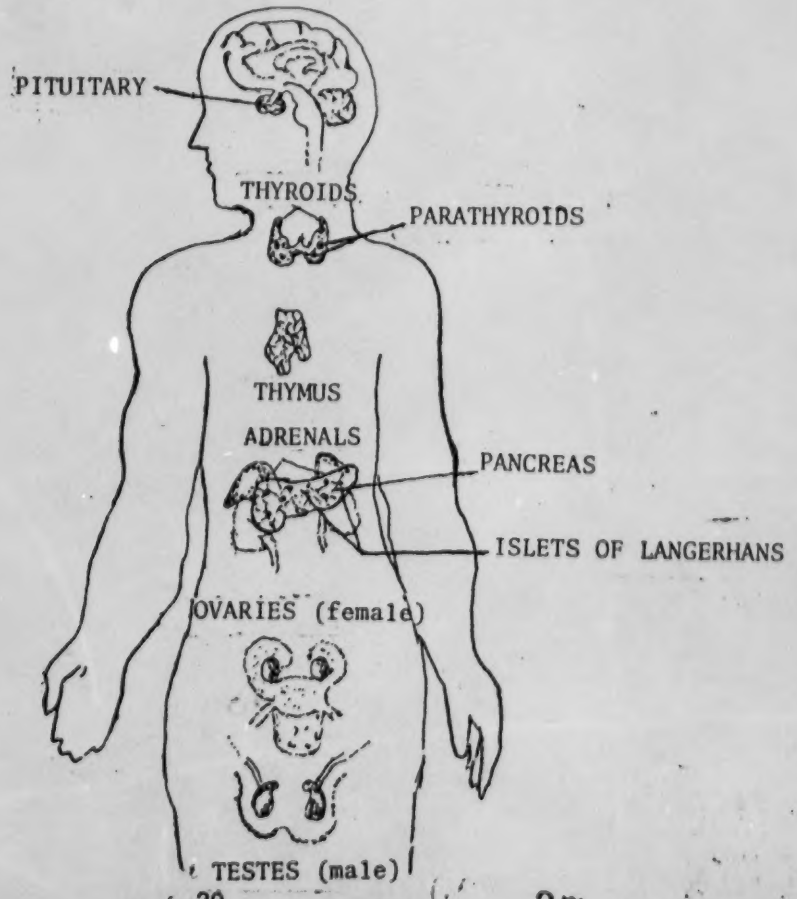
(I) The Endocrine System

The endocrine system is made up of endocrine glands working together. These endocrine glands have tissue cells which form secretions called hormones. Hormones speed up or slow down body processes.

Probably the most important gland in this system is the pituitary gland which is often referred to as the "master gland". Located in the brain, this gland produces the growth hormone which is important during your growing years.

Other glands in the endocrine system include the following: thyroid gland, parathyroid gland, thymus gland, adrenal gland, islets of langerhans, ovaries (female) and testes (male).

The illustration figure #7 shows some of these glands and where they are located in your body.



#7

Read - No reading required

Supplemental Aids

Audio-Visual

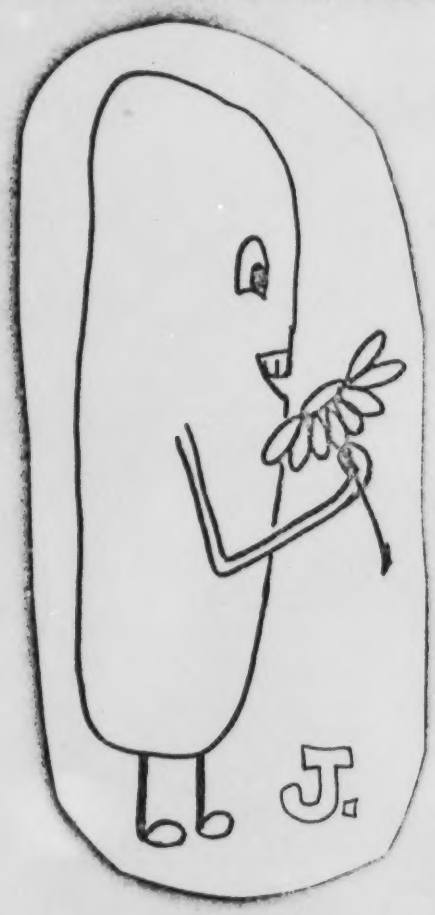
Human Physiology Series, Sve-Singer
Micro-Slides #71 Endocrine system
Kit 914 - Endocrine system (IMC Kodiak)

Activities

Using the micro-slide viewer and slides #71, make a drawing or illustration of two of the following endocrine glands:

pancreas
islets of langerhans
thyroid gland
parathyroid gland
adrenal gland

SENSE



ORGANS

UNIT 1: HUMAN BIOLOGY

TOPIC J: THE SENSE ORGANS

OBJECTIVES: 1) You will have some understanding of the five main senses: sight, hearing, taste, smell, and touch.
2) You will learn the important parts of the eye and ear and their functions.

One sense organ that allows us to do so many things is the eye. In order to understand how our eyes work, let's take a closer look at the human eye.

When we look at an object, light rays reflected from it reach our eye. These light rays pass through a covering called the (1) *cornea*. It then enters the eye through the opening called the (2) *pupil*. Musceles in the (3) *iris* control the size of the opening and amount of light that enters the pupil. A focusing device behind the iris called the (4) *lens*, then bends the light and produces a clear image. The image then travels to the (5) *retina*. *Rods* and *cons* found in the retina change the light to nerve *impulses*. These impulses lead to the (6) *optic nerve* which carries the message to the brain. Once these nerve impulses or messages reach the brain, they are changed to visual images.

The illustration of Figure (8) shows the steps that light rays take through your eye to make visual images.

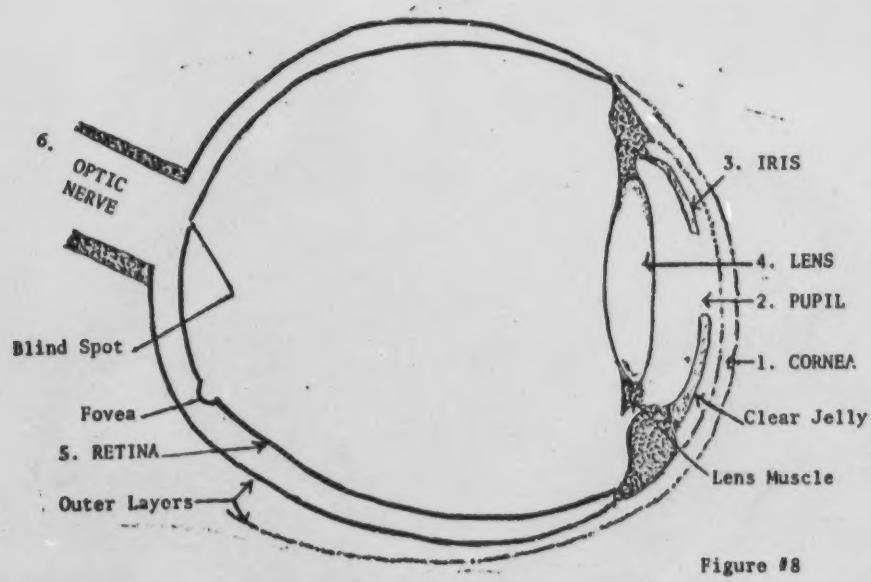


Figure #8

Hearing is another sense which we rely on to carry out many of our daily activities. As you are well aware, these are sounds all around us. We are able to tell what these sounds are by our brain. However, before the brain can tell what each sound is, it must have the help of your ear. Let's see how this hearing sense works.

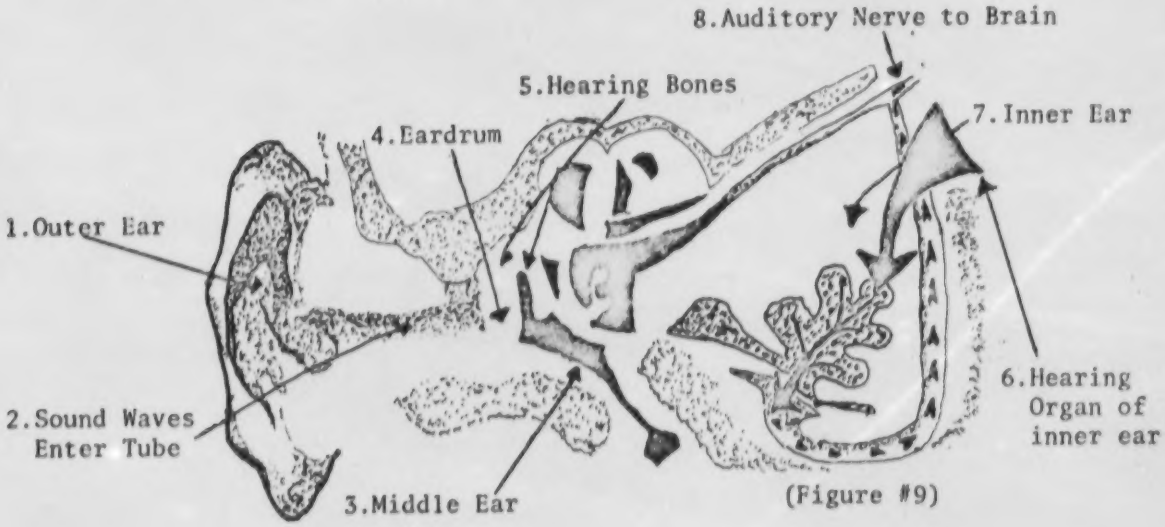
When a sound is made, the vibrations of that sound enter the (1) *outer ear*. From the outer ear they travel through a (2) *tube* and into the (3) *middle ear*.

In the middle ear, vibrations strike the (4) *eardrum* and the (5) *hearing bones*. They in turn send a vibrating motion to the (6) *hearing organ* called the *cochlea*, located in the (7) *inner ear*.

Inside the hearing organ is fluid. As this fluid vibrates it passes sound vibrations to the hairs in the hearing organ. These hairs form nerve impulses which send messages to the brain by way of the (8) *auditory nerve*.

The brain then identifies the sounds heard. This whole process of hearing takes a very short time.

Illustration Figure (9) traces the steps sound vibrations take through the ear:



(Figure #9)

The third sense is a delicate sense called taste. Taste buds on your tongue help you to determine whether something is sweet, sour, salty, or bitter.

Smell, another sense, works closely together with taste. For example, when we have a nose cold, we find the food we eat often tasteless.

Touch makes up the last basic sense in our study. In your skin are nerve endings called recepters. When these nerve endings are, for example, heated or cooled they send a message to the brain. The brain tells us how to react. (Picture what it would be like without these nerve endings.)

Other nerve endings are located inside your body. For instance, if you are hungry, nerves in the stomach react by sending messages to the brain. The brain then passes a message back to the stomach which starts conteracting.

READ: HANDBOOK OF BASIC SCIENCE, pages 269 - 274

SUPPLEMENTAL AIDS:

Audio-Visual:

HUMAN PHYSIOLOGY SERIES, SVE-Singer

Kit #915: EYE MODEL (IMC Kodiak)
KFS #61: UNDERSTANDING YOUR BODY (IMC Kodiak)
Microslides #99: THE SENSES

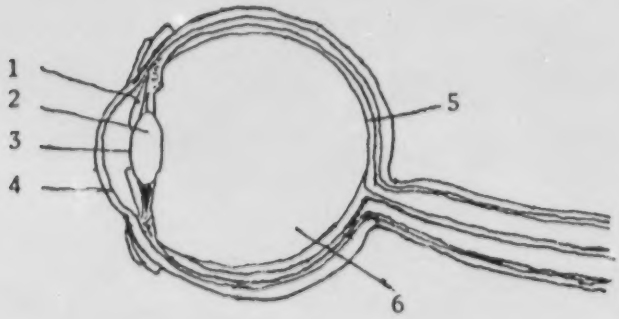
Activities

Spies-You and Me - Select and do two investigations from pp. 45-65. The investigations are the following:

Can you count two
Why do you have two eyes
And why two ears
The nose knows
Mapping your tongue

Action Biology - Vision Activity, pp. 288-290
Sense-of-touch activity, pp. 292-294

In the following diagrams below try to identify the main parts of the eye and the ear.



43

REPRODUCTIVE
K.
SYSTEM

OBJECTIVES:

1. YOU WILL BE ABLE TO HAVE A BETTER UNDERSTANDING OF HUMAN REPRODUCTION.

(k) THE REPRODUCTIVE SYSTEM:

The form of reproduction in which two reproductive cells unite to make a living organism is known as sexual reproduction. These reproductive cells are known as gametes.

In the human organism, the gametes are the sperm cells of the male which are produced by the testes. In the female the gamete is the egg which is produced in the ovary.

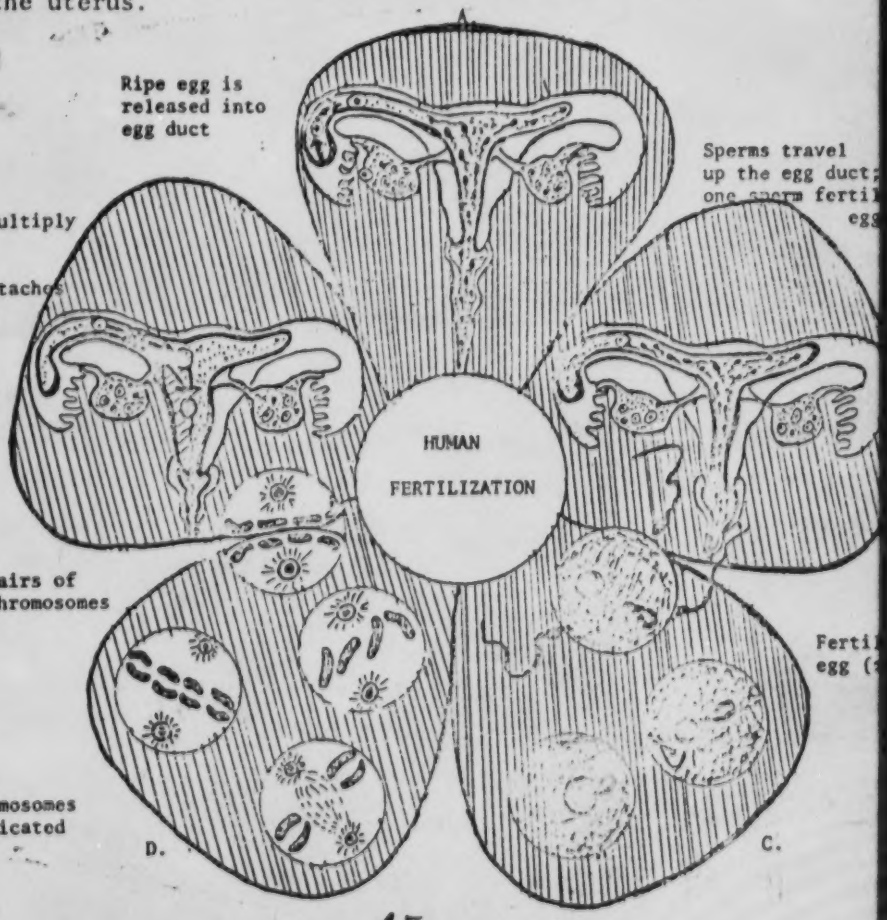
For reproduction to take place, the male sperm must swim up to the female egg and be able to fertilize it. If the egg becomes fertilized, it is known as a zygote.

Human fertilization takes place in the body of the mother called the uterus. In the uterus the embryo or developing baby implants itself in the wall of the uterus.

After the second month of development the embryo is called the fetus.

This fetus will continue to grow nourished by the food from the mother. Around nine months after fertilization, a new baby will be ready to enter the world.

Figure #10 at right shows the steps in human fertilization.



Read - Action Biology - "Reproduction" pp. 387-444

Supplemental Aids

Audio-Visual

Micro-slides - set 62

Transparencies 371-376 - Human Reproduction, Set 1 (IMC Kodiak)

Kit 579 - Story of Human LIfe Set 1 and 2

Activities

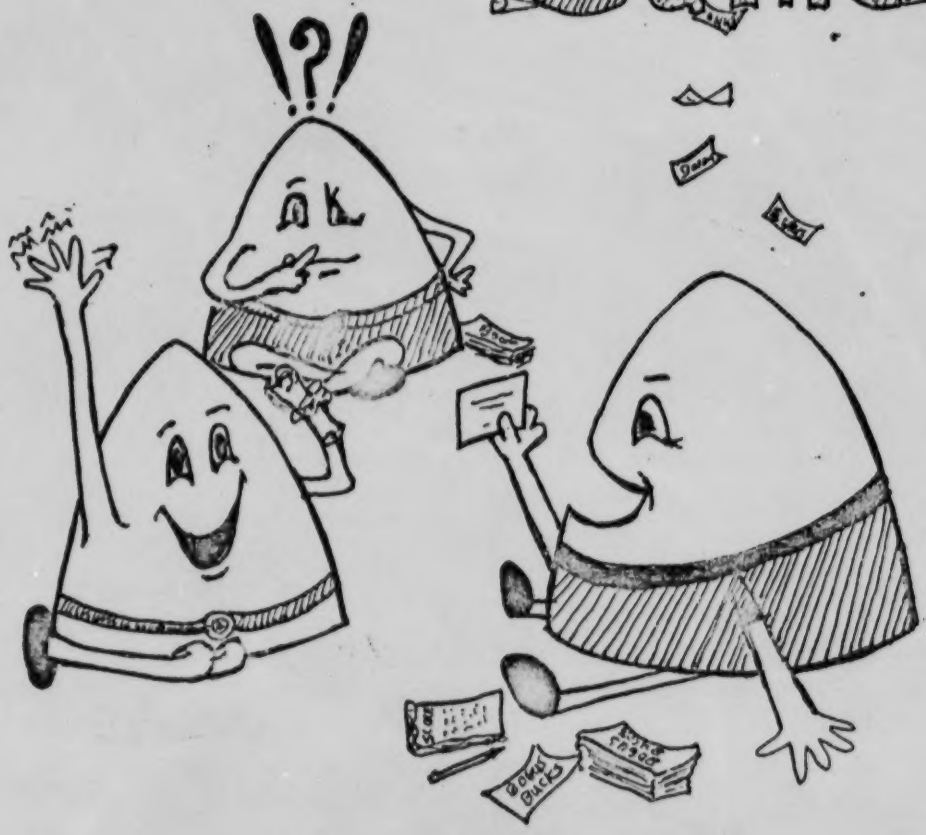
From the book Action Biology select two of the following activities:

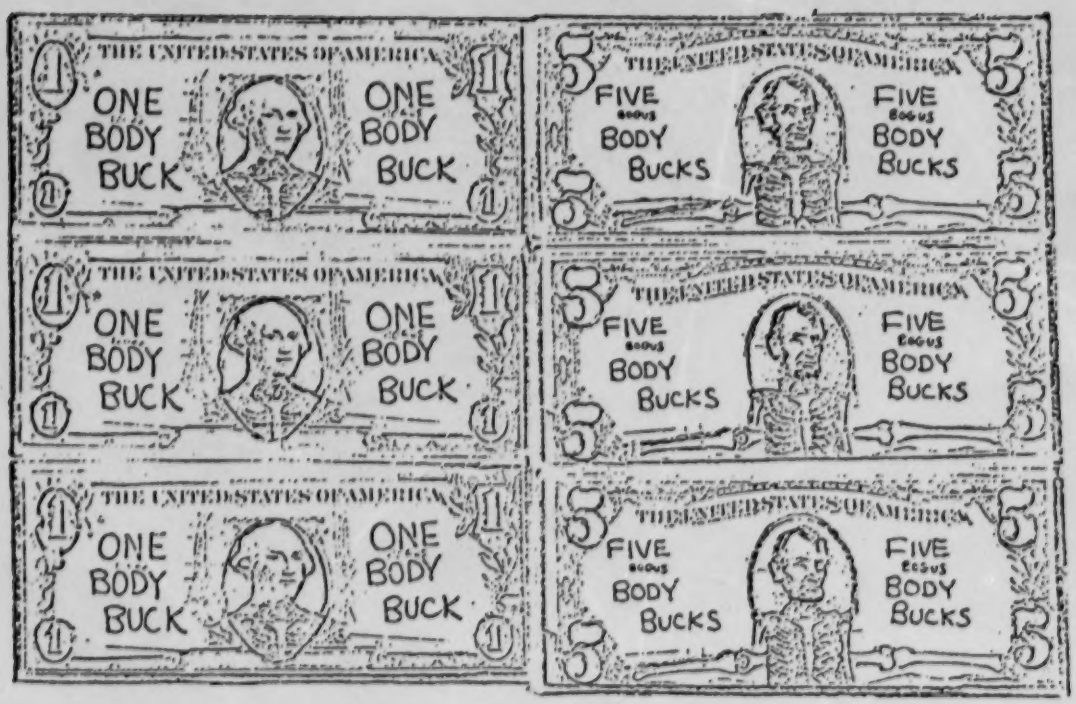
Reproduction word game	p. 394
Measure-the-baby	p. 404
Hormone-bingo worksheet	p. 410
Masculine-Feminine worksheet	p. 435-436

46

L.

The Body Bank Game





MONEY FOR THE BODY BANK GAME

For the Body Bank Game at the end of the Body Systems Unit, duplicate several pages of the Bogus Body Bucks. The total amount will depend upon how long the game runs with any group of students; on how much they play the game.

Regular play money could be used instead. If neither a duplicator or play money is available, construction paper could be cut in bill-sized rectangles, with red representing $1.00, blue represent $5.00.

BEST COPY AVAILA

(L) THE BODY BANK GAME

The purpose of the game is to help you learn some things about how the human body works. They say that 'knowledge is power'. It is also wealth. At least in this game that is true.

PEOPLE NEEDED: 3 or more

TIME NEEDED: 30 minutes, more or less

MATERIALS NEEDED: Question Cards and Play Money

One person acts as the banker (to dispense the money) and also as the knowledge broker (to hold the answer key to see if player's responses are correct).

Players draw $5 from the bank to start the game. With the question cards face down, players take turns drawing. A player draws a card and reads what it says. If he or she answers correctly, the player earns the amount stated on the card. If the answer is not correct, the player pays the bank that amount.

Cards may be put into a discard pile face down and again to keep the game going.

Variations: GAME MAY BE PLAYED WITH 2 PEOPLE, WITH BOTH SHARING THE JOBS OF BANKER AND KNOWLEDGE BROKER.

MAKE UP OTHER RULES TO THE GAME!

MAKE UP OTHER QUESTION CARDS!

ADD SURPRISE CARDS, BOTH POSITIVE & NEGATIVE!

Examples:

YOU START RUNNING TO IMPROVE YOUR MUSCLE TONE Worth $5

YOU ATE TOO MUCH CANDY & DEVELOPED TOOTH DECAY PAY $5

For the Body Bank Game at the end of the Body Systems Unit, duplicate several pages of the Bogus Body Bucks. The total amount will depend upon how long the game runs with any group of students; on how much they play the game. Regular play money could be used instead. If neither a duplicator or play money is available, construction paper could be cut in bill-sized rectangles, with red representing $1, blue representing $5.

BEST COPY AVAILABLE

1)

A group of tissues organized to do a particular job is called an _____.

WORTH $1

2)

The 9 basic system of organs in the human body are:

WORTH $1 each

If all 9 are correct, you will be rewarded a $5 bonus, for a total of $14.

3)

Two purposes the skeleton serves in our bodies are:

1)_____
2)_____

WORTH $2

4)

When 2 bones in the skeleton come together, they form a _____.

WORTH $1

5)

The mineral the body uses primarily to make the bones hard is_____.

WORTH $1

6)

The soft material that fills the hollow space in bones is called _____.

WORTH $1

7)

The bones of the spine are called_____.

WORTH $1

8)

For $1, spell all 3 of the following words correctly:

vertebra
skeleton
calcium

WORTH $1

9)

TRUE OR FALSE????

Joints like the hip & shoulder are called ball & socket joints.

WORTH $1

10)

TRUE OR FALSE????

Cartilage is a food we eat to make our bones strong.

WORTH $1

11) The muscle that bends the lower arm upward is called_____. WORTH $1	16) The outer layer of skin is called the _____. WORTH $1
12) The muscle that pulls the lower arm back after it has been bent upward is called_____. WORTH $1	17) TRUE OR FALSE???? The most important task of the skin is to keep germs out of the body. WORTH $1
13) TRUE OR FALSE???? When using energy, the muscle produces force. Then it rests, taking on carbon dioxide and giving off oxygen. WORTH $1	18) TRUE OR FALSE???? Most of the outer layer of skin is dead cells. WORTH $1
14) TRUE OR FALSE???? When the body is motionless all muscles are relaxed. WORTH $1	19) TRUE OR FALSE???? The outer layer of skin contains the blood vessels and nerves. WORTH $1
15) TRUE OR FALSE???? If a muscle is forced to keep pulling, it finally runs out of oxygen and stops. WORTH $1	20) TRUE OR FALSE???? Healthy hair is made up of living cells. WORTH $1

21)

Two materials that the blood carries to the body cells are:

1)_____

2)_____

WORTH $2

22)

Name the 4 basic parts of the blood:

1)_____
2)_____
3)_____
4)_____

WORTH $1 each

If all 4 are named correctly, you earn a bonus of $1.

23)

Another name for red or white blood cells is red or white_____.

WORTH $1

24)

When blood from one body is pumped into the circulatory system of another person, we call the process a _____.

WORTH $1

25)

The 4 blood types are:

1)____
2)____
3)____
4)____

WORTH $1 each

26)

The book type that can be used for transfusions to anybody is _____.

WORTH $1

27)

TRUE OR FALSE????

The circulatory system is made up of the heart, the blood vessels, the blood, and the lymph.

WORTH $1

28)

TRUE OR FALSE????

Antibodies fight disease germs.

WORTH $1

29)

Blood vessels that carry blood away from the heart are called _____.

WORTH $1

30)

Blood vessels which carry blood to the heart are called_____.

WORTH $1

31)

The 4 chambers of the heart are called:

1)____
2)____
3)____
4)____

WORTH $1 each

If all 4 are named you earn a bonus buck, for a total of $4.

32)

The tiny blood vessels that carry blood to body cells are called _____.

WORTH $1

33)

Capillaries in the _____ release carbon dioxide in exchange for oxygen.

WORTH $1

34)

The 3 types of blood vessels in the body are called:

1)____
2)____
3)____

WORTH $1 each

35)

The muscle which separate the stomach cavity from the lung cavity is called the _____.

WORTH $1

Earn an extra $1 by spelling it.

36)

When we take air into the lungs, it is called_____. When our cells exchange one gas for another, it is called_____.

WORTH $1

37)

The part of the respiratory system that holds the vocal cords is called the_____.

WORTH $1

38)

When the body does not get an adequate supply of oxygen, it dies from a condition called____.

WORTH $1

39)

Some animals eat only plants. They are herbivorous. Others eat only meats. They are carnivorous. People eat both plants and meat. They are _____.

WORTH $1

Earn an extra $1 by spelling it.

40)

TRUE OR FALSE????

When we exhale, the chest pushes against the lungs and forces air out.

WORTH $1

41)

INGESTION, DIGESTING, & ABSORPTION are the 3 steps in the digestive process. What happens in each step?

WORTH $1 each

For all 4 correct you earn a bonus $2, for a total of $5.

42)

TRUE OR FALSE???

The stomach churns the food we eat into a thick mixture.

WORTH $1

43)

TRUE OR FALSE????

Carbohydrates (sugars and starches) take longer to digest than fats.

WORTH $1

44)

TRUE OR FALSE????

The small intestine is the place where most of our food is absorbed into the blood stream.

WORTH $1

45)

TRUE OR FALSE????

The food that goes into the large intestine is nothing but waste, matter, and water.

WORTH $1

46)

TRUE OR FALSE????

Another name for the large intestine is the _____.

WORTH $1

47)

TRUE OR FALSE????

Our bodies are at least 70% water.

WORTH $1

48)

The brain and the spinal cord are called the _____.

WORTH $2

49)

Besides water, vitamins, and minerals, the foods our bodies need are:

a._____
b._____
c._____

WORTH $3

If all 3 are given, reward a bonus $1, for a total of $4.

---

50)

The 'thinking' part of the brain is called the_____.

WORTH $1

---

51)

The part of the brain that regulates appetite, body temperature, and blood pressure, is the_____.

WORTH $1

---

52)

TRUE OR FALSE????

A neurosis is a brain disorder caused by emotional upset.

WORTH $1

THE BODY BANK GAME

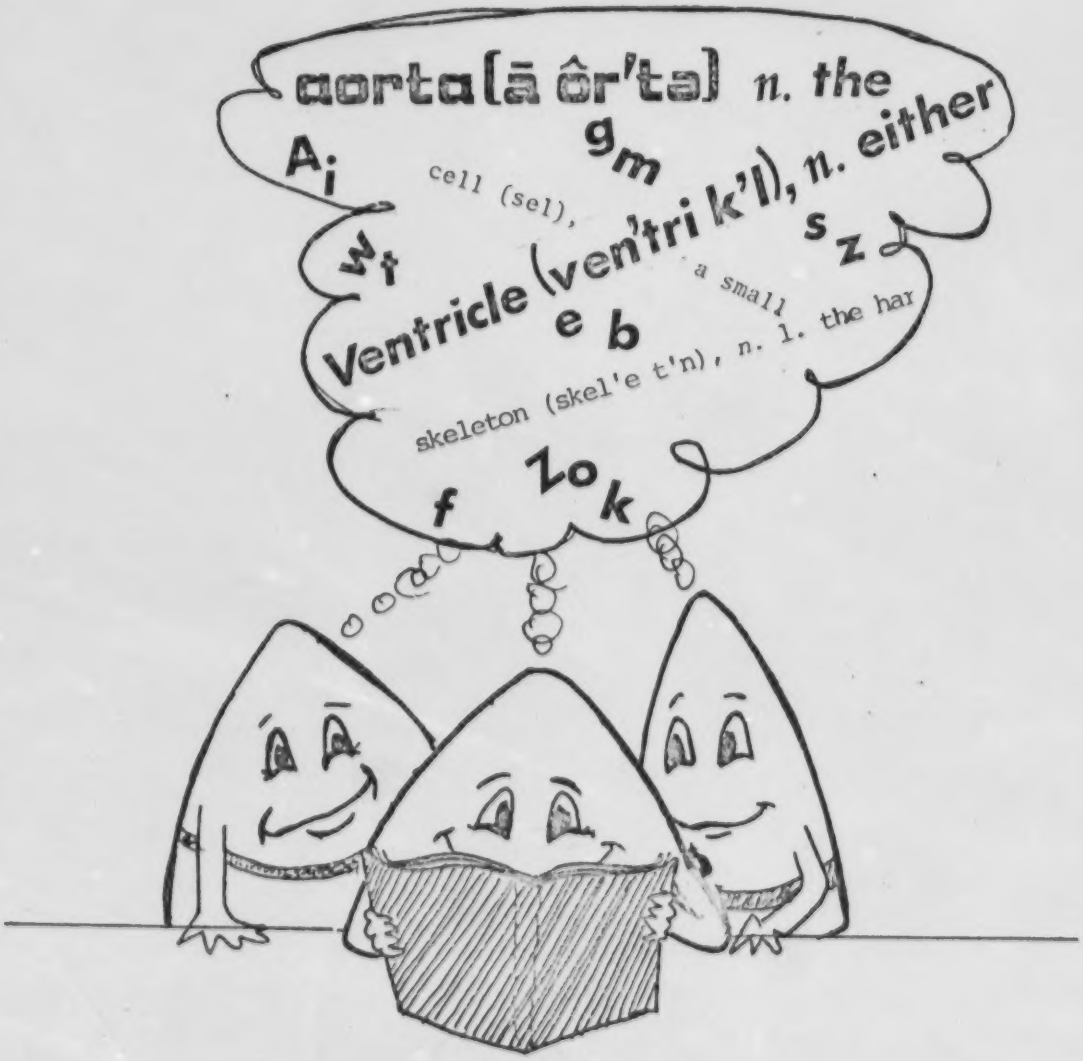
ANSWERS:

1) Organ
2) Circulatory system
   Skeletal system
   Digestive system
   Respiratory system
   Execretory system
   Muscular system
   Nervous system
   Endocrine system
   Reproductive system
3) 1)they shape and support the body; some (head & trunk protect vital organs) serve as manufacturing center for blood (any 2).
4) Joint
5) Calcium
6) Marrow
7) Vertebra
8) Vertebra, skelton, calcium
9) True
10) False
11) Bicep
12) Tricep
13) False
14) False
15) True
16) Epidermis
17) True
18) True
19) False
20) False
21) Food, oxygen
22) Plasma, red blood cells, white blood cells, blood platelets
23) Corpuscles
24) Blood transfusion
25) O.A.B.AB
26) O
27) True
28) True
29) Arteries
30) Veins
31) Left & right ventricles
    Left & right auricles
32) Capillaries
33) Lungs
34) Arteries, veins, capillaries
35) Breathing, respiration
36) Diaphragm
37) Larynx
38) Asphyxia
39) Omnivorous
40) True
41) Ingestion: taking the food into the body;
    Digestion: changing the food to chemicals;
    Absorption: taking chemicals into the bloodstream
42) True
43) False
44) True
45) True
46) Colon
47) True
48) Fats, proteins, carbohydrates
49) Central nervous system
50) Cerebrum
51) Thalamus

58

M.

GLOSSARY OF TERMS



(m) GLOSSARY OF TERMS ON BODY SYSTEMS

A

abdomen - The part of the body containing the stomach, intestines, liver, etc.

absorb - To suck up, as does a sponge.

absorption - Passage of liquid from the digestive system into the blood stream.

adrenal glands - Paired ductless glands near the kidneys which release a chemical which stimulates the nervous system in response to fear, exercise, and excitement.

amino acids - Units found in substances such as proteins.

anatomy - The study of the structure of living things.

antibody - A substance in animal organisms to combat bacteria and other foreign substances.

antidote - Means to counteract poison.

aorta - Main artery which leads blood from the heart.

artery - Vessel whose function is to carry blood away from the heart throughout the body.

auditory nerve - Hearing nerve that carries messages of sound to the hearing center of the brain.

auricle - One of the chambers in the heart that receives blood from the veins.

B

bacteria - One-celled organisms that do not have chlorophyll. Some cause diseases in people and other animals.

biceps - Muscles that control the forearm.

bicuspids - Teeth specialized for grinding.

GLOSSARY - cont.

biology - The science of living things.

bladder - Storage organ for urine.

blood - The fluid which circulates in the heart, arteries, and veins of animals, carrying nourishment and oxygen to all parts of the body and bringing away waste products.

brain - The central part of the nervous system located in the skill of vertebrates. It controls and co-ordinates action.

bronchial tubes - The branches of the trachea that lead into the lungs.

calcium - A mineral the body uses in building teeth and bones.

capillaries - Small tubes in the body that connect the branches of the arteries with those of the veins.

carbohydrates - Foods containing carbon, hydrogen, and oxygen in the ratio CH_2O. Starches and sugars are carbohydrates.

carbon dioxide - A gaseous compound. It is a waste product expelled by the lungs.

cartilage - Tough elastic animal tissue forming connections in the skeleton.

cell - The basic unit of plant and animal structure consisting of protoplasm and a nucleus encased by a membrane.

cell division - The form of asexual reproduction in which a cell divides in two.

central nervous system - The nervous tissue that coordinates the activities of an organism. In vertebrates, such as humans, it is the brain and spinal cord.

GLOSSARY - cont.

cerebellum - Part of the brain below the cerebrum that coordinates muscular movement.

cerebrum - Upper front part of brain, the center of voluntary and thinking processes.

cholesterol - A fatty substance present in animal and vegetable cells. Heavy concentrations in the blood vessels may cause high blood pressure.

chromosomes - Threadlike structures in the nucleus of cells, carrying hereditary determiners.

circulatory system - The complex system of vessels through which the blood flows, consisting of arteries, veins, capillaries, and the heart chambers.

clotting - Coagulating or forming a thick mass.

cochlea - The snail shaped part of the inner ear.

colon - The large intestine.

cornea - Transparent outer layer in front of the eyeball.

corpuscles - Term for white and red blood cells.

cranium - Part of skull encasing the brain.

cytoplasm - All the protoplasm in a cell outside the nucleus.

dermis - Innermost of the two layers of skin, the outer being the epidermis.

diaphragm - The layer of muscle separating the chest from the abdomen; important for respiration.

DNA - Deoxyribose nucleic acid. One of two kinds of chemical substances in the chromosomes believed to be responsible for the transmission of hereditary determinants in a sort of hereditary code from generation to generation.

ductless glands - Glands without a tube or canal for secretion, as the thyroid or pituitary.

egg - Reproductive cell produced by female organisms.

endocrine glands - Hormone secreting ductless glands such as the thyroid, pancreas, or pituitary.

energy - The capacity to do work.

environment - The natural conditions that surround an organism, animal, object, or human.

embryo - An early stage of development.

epidermis - The outer layer of skin.

esophagus - The tube connecting the pharynx to the stomach, through which food passes.

eye - Body organ which receives light and converts it into an image.

fats - Liquid or solid substances from vegetable or animal sources. Butter, olive oil, lard are examples.

fetus - An unborn baby in the mother's uterus.

G

gametes - Sex cells that unite in reproduction.

gene - Part of a chromosome in the cell nucleus which affects heredity.

germ - A microbe or disease-carrying organism. Sometimes, a reproductive cell.

germicide - Agent for killing germs.

gland - An organ that secretes a chemical compound for the body to use.

H

hair - Threadlike protrusions growing from the skin.

hemoglobin - Red coloring matter of the blood responsible for carrying the oxygen.

hemophilia - Abnormal tendency to bleed.

heredity - Transmission of characteristics from parent to offspring through the genes.

hormones - Chemicals secreted by special glands or tissues in the body that act as signals for the tissues.

I

immune - Safe from diseases.

incisors - Four cutting teeth in each jaw used for biting.

K

kidney - Organs that form urine and eliminate liquid wastes.

L

large intestine - An organ of the body which aids in digestion.

larynx - The voice box. The upper part of the windpipe.

ligament - A band of strong tissue that connects bones.

liver - Organ that makes a digestive juice and helps the body use food.

lymph - Colorless liquid which bathes the body cells. It circulates in an independent vessel network between blood and tissues.

M

malnutrition - Lacking in nourishment.

mammals - Vertebrates that suckle their young, have hair, and have a diaphragm for respiration. People are mammals, as are whales and horses.

medulla - Lowest part of the brain, leading to spinal cord. It directs heart movement, breathing, and circulation.

membrane - Layer of tissue.

metabolism - Chemical activities that take place in the cells of living organisms. Two such activities go on at once--The breaking up of some substances, and the building up of others.

GLOSSARY - cont.

mitosis - Cell nucleus division, with each chromosome splitting into two and moving to opposite sides to form the center of the two new daughter cells.

molars - Broad teeth used for grinding and crushing.

muscle - Cells that contract and cause movement.

nerve - A group of cells whose function is to transmit sensations or impulses from one part of the body to another. They are the body's messengers.

nucleus - The central part of the cell containing the controlling agents.

nutrition - Processes by which food is processed by an organism. It involves taking in food, assimilating it, and turning it into usable tissue for energy and growth.

optic nerve - The nerve that goes from the brain to the eyeball.

organ - A part of an animal or plant having a specific function.

organism - A living plant or animal having structural parts operating as a unit.

ovary - Female reproductive organ.

oxidation - The uniting of oxygen with some other substance.

oxygen - A gas found in the air, necessary for life processes.

P

pancreas - Organ of digestion that secretes enzymes. Located behind the lower stomach.

pharynx - Throat.

pituitary - Endocrine gland which produces hormones affecting growth, kidney operation, and other glands. Located at base of the brain.

plasma - Fluid content of blood or lymph.

proteins - Substances in all living cells made up of chains of amino acids. It is necessary for a person to constantly replenish the supply of protein in his or her body by eating meat, drinking milk or the like.

protoplasm - The living matter of cells.

pupil - The opening in the iris of the eye.

R

reproduction - Animal or plant bringing another of its kind into existence. It may be sexual, involving a male and female, or asexual, involving only one parent.

respiration - Inhaling and exhaling (breathing) so that oxygen is taken into the body and carbon dioxide is expelled from the body.

retina - The light sensitive layer inside the eye.

S

saliva - A juice produced by the salivary glands in the mouth that helps in digestion.

secrete - To make and give off substances. eg. - Glands secrete hormones.

sexual reproduction - Reproduction involving two parents.

skeleton - The bony framework of an animal's body. The human skeleton has over 200 bones held together by cartilage.

skin - The body covering of vertebrates.

small intestine - Carries on most of the chemical digestion of food.

sperm - Male sex cell.

spinal column - The vertebrae that enclose the spinal cord.

spinal cord - The part of the central nervous system extending down the spinal column, connected to the brain at the upper end. It conducts impulses to and from the brain.

starch - A carbohydrate. It is a chief element in cereals.

stomach - An enlarged region of the digestive tract that churns the food and mixes it with enzymes.

system - Those organs collectively that contribute toward one of the vital functions. The digestive system is an example.

T

testes - Male reproductive organ.

thyroid - A gland in the neck which secretes hormones that help regulate the body metabolism.

tissue - Groups of cells working together to form a common function. eg. muscle cells form muscle tissue.

triceps - The muscle of the upper arm that causes straightening of the arm.

U

urine - A liquid containing wastes and salts in water. It is excreted by the kidneys.

uterus - The organ of a female mammal in which the unborn young develops.

V

valve - A device for regulating the flow of fluids. The heart has a number of valves.

vein - A vessel that carries blood to the heart.

ventricle - Lower chambers of the heart, the pumping part, that sends the blood into the arteries.

vertebrate - Animals with backbones, a bony skeleton, and the brain encased in the skull.

vertebrae - The sections of the backbone.

GLOSSARY - cont.

vitamins - Chemical substances vital to health. Vitamin deficiencies can cause diseases.

volume - The space taken up by a solid, a liquid or a gas.

water - H_2O. A chemical compound making up about 70% of the body weight. It must be replenished constantly or we die.

zygote - Fertilized egg.

UNIT TEST A

UNIT 1 HUMAN BIOLOGY RESULT

NAME DATE CRITERIA 45/60

Exercise 1: Underline the word or phrase inside the parenthesis, which is most closely related to the word on the left.

Example: skeleton (bones, heart)

Marks

(20)	1.	cell	(living, non-living)
	2.	skeleton	(joint, nerve)
	3.	biceps	(muscle, joint)
	4.	bronchial tubes	(digestive, respiratory)
	5.	small intestine	(nervous system, digestive system)
	6.	circulatory system	(kidneys, blood vessels)
	7.	urinary system	(bladder, capillaries)
	8.	spinal cord	(nervous system,respiratory system)
	9.	pituitary gland	(circulatory system, endocrine system)
	10.	cornea	(eye, ear)
	11.	optic nerve	(ear, eye)
	12.	sperm	(reproductive system, respiratory system)
	13.	hemoglobin	(white blood cell, red blood cell)
	14.	lungs	(respiratory system, nervous system)
	15.	salivary glands	(digestive system, muscle system)
	16.	reproductive system	(testes, esophagus)
	17.	nervous system	(cerebrum, thyroid gland)
	18.	gametes	(reproductive system, endocrine system)
	19.	capillaries	(blood vessels, nerves)
	20.	ear	(auditory nerve, iris)

Exercise 2: In the diagram of the digestive system put the correct parts in the blank spaces:

(6)

stomach

salivary glands

liver

small intestine

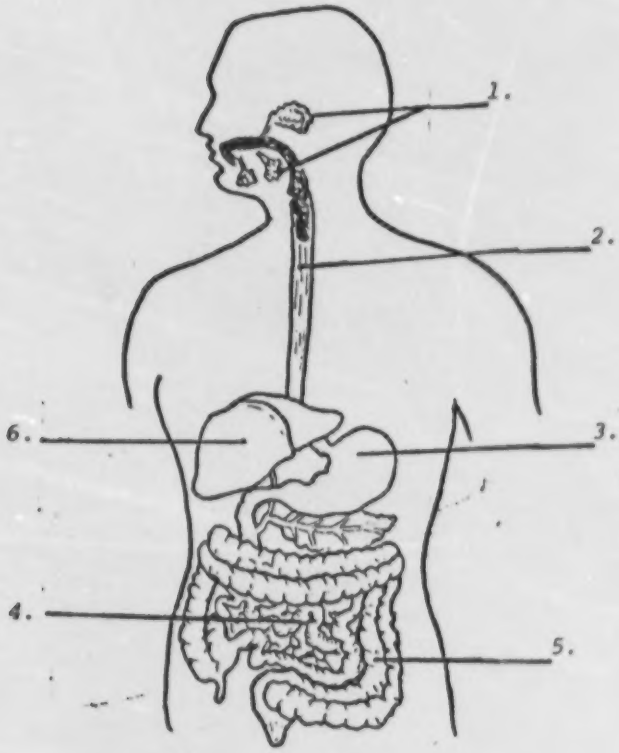
large intestine

esophagus

71

The previous numbered page in the original document was blank

Exercise 2 DIGESTIVE SYSTEM



Exercise 3: Explain the difference between voluntary muscles and involuntary muscles.

(5)

Exercise 4: Name four parts of the respiratory system.

(4)

1. _____

2. _____

3. _____

4. _____

Exercise 5: Why are the following below important to our circulatory system?

(6)

1. arteries _____

_____

2. veins _____

_____

3. heart _____

_____

Exercise 6: In the blanks, on the diagram write in the main parts of the central nervous system which are listed below.

(4)

cerebrum

spinal cord

cerebellum

medulla

Exercise 7: Explain what would happen if our urinary system stopped working correctly.

(5)

_____

_____

_____

Exercise 8: Why is the pituitary gland of the endocrine system often called the "master gland"?

(5)

_____

_____

_____

Exercise 9: List the parts of the eye in the blank spaces on the diagram below.

(5)

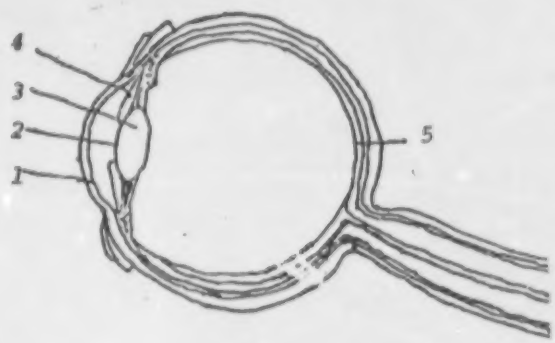
retina

cornea

iris

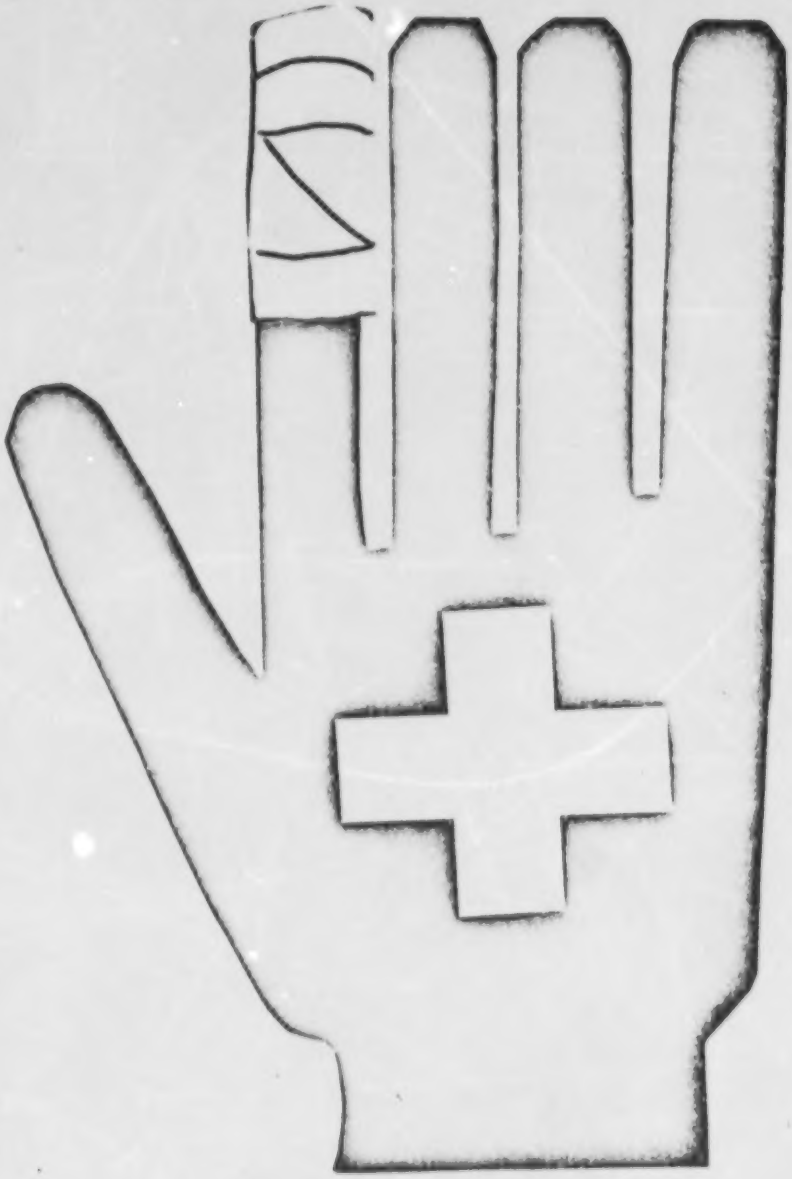
lens

pupil



74

UNIT 2.



FIRST AID

A. WOUNDS

OBJECTIVES:

1. The student must be able to explain the difference between open and closed wounds.
2. The student must be able to explain the correct treatment for shock.
3. The student must demonstrate application of three types of bandaging.

UNIT 2

TOPIC A: Wounds

First aid is the immediate care given to an injured or sick person who has suddenly taken ill. First aid knowledge and skill often means the difference between life and death.

A wound is a break in the tissues of the body, either internal or external.

Classification of wounds:

a) Open.

An open wound is a break in the skin or mucous membrane.

b) Closed.

A closed wound involves injury to underlying tissues without a break in the skin or a mucous membrane.

Wounds are treated best by the direct application of pressure to the wound. Direct pressure is applied with the thumbs or fingers over a sterile gauze pad to the part of the wound from which the blood is coming. If there is a foreign body in the wound, the pressure must be applied around it. Here are the general rules for the treatment of wounds:

1) Place the casualty in a suitable position, bearing in mind that blood escapes with less force when the patient lies down.

2) Elevate the bleeding part, except in the case of a fractured limb.

3) Expose the wound, removing as little clothing as possible.

4) Do not disturb any blood clot already formed.

5) Remove any foreign bodies that are visible and can be easily picked or wiped off with a clean dressing.

6) *Apply and maintain direct pressure.*

7) Apply a dressing, pad, and bandage.

8) Immobilize the injured part. Use splints over a joint if necessary.

9) Note the amount of blood lost and give this information to the doctor.

'BASIC FIRST AID'- Book 4 pp. 71 - 128

Answer summary questions 1-9 (pp. 120 - 128)

PROJECT DISCOVERY - *'MEDICAL EMERGENCY SERVICES'*

With another student do:Activity 1 - Bandaging.
Activity 2 - Wound Care.

SUPPLEMENTAL ACTIVITIES:

Standard First Aid and *Personal Safety.*

Chapter 2, pp. 18 - 37.

78

B.

SHOCK

OBJECTIVES: 1. The student be able to list major causes of shock.

2. The student must be able to list symptoms of shock.

3. The student must be able to outline the general treatment for shock.

UNIT 2

TOPIC B: SHOCK

When a person is badly injured, he may develop a serious condition called *shock*. In shock cases, the blood flow in the body is disturbed, even in parts distant from the injury. The brain does not get enough blood. Thinking is difficult, digestion of food is slowed, and all body processes are at a low level. The injured person feels exceedingly weak. Unless he receives proper care, he may die of shock, or his recovery may be greatly delayed.

When given first aid, shock must almost always be treated.

There are numerous conditions which may cause shock. In general it will follow most injuries. It will occur after each of the following:

a) Lack of oxygen.
b) Loss of body fluids (prolonged vomiting and dysentery).
c) Burns.
d) Severe bleeding.
e) Poisoning.
f) Heart attacks.
g) Extreme pain.

Give necessary first aid immediately to eliminate causes of shock, such as stoppage of breathing, hemorrhaging, or severe pain. Steps for preventing shock and for giving first aid are:

1) Keep the victim lying down.

2) Cover him only enough to keep him from losing body heat.

3) Get medical help as soon as possible.

Shock is a condition whereby the body tries to conserve blood by concentrating it in the inner organs. *It is often fatal and many people have died because the shock accompanying a simple injury was not treated.*

In the early stages of shock, the body compensates for a decreased flow to the tissues by constricting the blood vessels in the skin, soft tissues, and skeletal muscles. The following signs of shock may develop:

1) The skin may be moist and clammy.
2) The victim is weak.
3) The skin is pale (bluish) and cold to the touch.
4) The rate of breathing is usually increased.
5) Nausea and vomiting develops.
6) Breathing and pulse are usually rapid.

If the victim remains in shock and the condition becomes worse, the following additional signs may be noted:

1) The victim's eyes are sunken with pupils widely dilated.

2) The victim becomes unresponsive.
3) If untreated, the victim eventually loses consciousness, body temperature falls and death may occur.

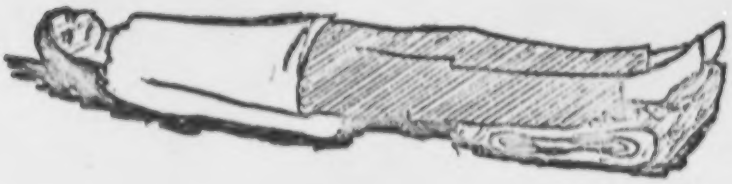
Body Positions

The position for a victim must be based on the injuries. Generally, the most satisfactory position for the injured person will be lying down to improve the circulation of the blood.

A victim with severe wounds of the lower part of the face and jaw, or who is unconscious, should be placed on his side to allow drainage of fluids and to avoid blockage of the airways by vomit and blood.

If a person is having trouble breathing and there is no danger of being choked by fluids (blood, vomit), the victim may be placed with head and shoulders raised.

Victims in shock may improve if the feet are raised 8 to 12 inches. If the victim has increased difficulty in breathing or experiences additional pain after feet are raised, lower the feet again.



If in doubt concerning the proper position of the victim based on injuries sustained, keep him lying flat.

BASIC FIRST AID, Book 1, pp. 3 - 48.

Answer Summary Questions 1-7, pp. 41 - 48.

QUESTIONS:

1. *What are five conditions which may cause shock?*

_____

_____

_____

_____

_____

2. *What are three symptoms of shock (signs that a person may be in shock)?*

_____

_____

_____

3. *Your neighbor has fallen off a ladder and has badly injured his head. He is bleeding from the mouth and may be going into shock. What should you do:*

_____

_____

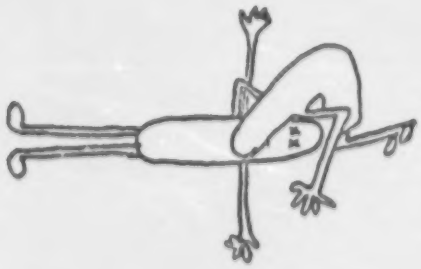
_____

_____

_____

83

C. ARTIFICIAL RESPIRATION



OBJECTIVES: 1. The student must be able to outline the way in which mouth rescue breathing should be administered.

UNIT 2

TOPIC C: ARTIFICIAL RESPIRATION

Artificial respiration is a method of causing air to flow into and out of a person's lungs when natural breathing has stopped or slowed to a dangerous rate. Even though there may be doubt as to whether the heart is beating, artificial respiration should be attempted.

A review of the important steps involved in artificial respiration follows:

1) *Why rescue breathing?* The lungs in your chest cavity take in air and pass the oxygen to the blood to be carried to all parts of the body. If the cells of the body are deprived of oxygen, they will die. The cells of the brain will begin to die if they are deprived of oxygen for only four minutes. Since the cells of the brain cannot be replaced, it is important to start artificial respiration as soon as possible.

2) *Don't delay!* Artifical respiration should be started as soon as possible, even if the patient is still in the water. A delay of only 10 seconds can mean the difference between life and death.

3) *Clear the air passage*. This may involve tilting the head to allow the water to pour out, or inserting a finger to remove vomit or mucous. The air passage should be straightened by tilting the head back.

4) *Get some air into his lungs quickly!* Breathe into the victim's mouth six or seven times in a row. This is in order to get some air into his lungs quickly. If the chest rises and the air comes out easily, you may continue putting air in every three to five seconds. (It may be necessary to close the victim's nose.)

5) *Continue rescue breathing for hours*. How long should you continue rescue breathing before giving up? You should continue rescue breathing until the patient begins to breathe for himself or until he is pronounced dead by a doctor. Patients, especially after electric shock, have revived after several hours of artificial respiration.

Read *BASIC FIRST AID*, Book 1, pp. 145 - 206.

Answer Summary Questions 1-7, pp. 253 - 260.

QUESTIONS:

1. *How long should you wait before administering rescue breathing to a victim of electric shock?*

   _____

2. *Kenny fell off his fishing boat and nearly drowned. When he was hoisted on deck, he was not breathing. Explain the steps you would take to try and revive him?*

   _____

   _____

   _____

SUPPLEMENTAL:

STANDARD FIRST AID AND PERSONAL SAFETY, Chapter 5, pp. 66 - 90.

Kit 784, Rescue Breathing slide set (E-J-S) IMC, Kodiak.

86

D. BURNS

OBJECTIVES: 1. The student must be able to explain the difference between major and minor burns.

2. The student must be able to give treatment for each kind of burn discussed.

UNIT 2

TOPIC D: BURNS

A burn is an injury that results from heat, chemical agents, or radiation. It may vary in size or severity.

There are three types of burns. They are called *first degree*, *second degree*, and *third degree*. The severity of the burns range from a first degree mild sunburn to a third degree electrical burn needing hospitalization.

Burns are most commonly caused by:

1)Carelessness with matches and in cigarette smoking.
2)Scalds from hot liquids.
3)Defective heating, cooking, and electrical equipment.
4)Use of open fires that produce flame burns, especially when flammable clothing is worn.
5)Unsafe practices in the home, in the use of flammable liquids for starting fires, for cleaning, and for scrubbing wax off floors.
6)Immersion in overheated bath waters.
7)Use of chemicals, such as lye, strong acids, and strong detergents.

The three degrees of burns are classified according to the depth of skin damage. First degree burns are those resulting from overexposure to the sun, light contact with hot objects, or scalding by hot water or steam. The usual signs are:

1)Redness or discoloration.
2)Mild swelling and pain.
3)Rapid healing.

Second degree burns are those resulting from a very deep sunburn, contact with hot liquids, and flash burns from gasoline, kerosene, and other products. The usual signs are:

1)Greater depth than first degree burns.
2)Red appearance.
3)Development of blisters.
4)Considerable swelling over a period of several days.

5)Wet appearance of the surface of the skin, due to the loss of blood through the damaged layers of the skin.

Third degree burns are the most severe. Major skin damage occurs. Third degree burns can be caused by a flame, ignited clothing, immersion in hot water, contact with hot objects, or electricity. The usual signs are:

1)Deep tissue destruction.
2)White or charred appearance.
3)Complete loss of all layers of skin.

The objective of first aid for burns is to relieve pain, prevent contamination, and treat for shock.

The treatment for minor burns is to sink the affected part in cold water. If the affected part cannot be immersed in water, wet cold towels should be put on the burn. The water cuts off the air to the burn and relieves the burning feeling. Once the pain has gone, no further treatment is generally required.

A major burn is one in which all layers of the skin are destroyed, often with destruction of underlying fat and muscle tissue. The burned area may be a yellow, cooked color or it may be charred and black. Swelling begins at once and may extend to the whole body. Shock may often occur. The treatment for major burns is as follows:

1)Use clean hands and handle as little as possible to avoid pain and infection.

2)Cover the area with a sterile dressing.

3)Bandage firmly to prevent air from reaching the wound, except if blistering is present.

4)Immobilize the affected area.

5)Do everything to help prevent shock.

6)Attempt to get patient to medical aid as soon as possible.

The following are equally important steps to avoid:

DO NOT apply salves or lotions.

DO NOT remove burnt clothing stuck to the wound.

DO NOT break blisters.

Two other types of burns are chemical burns of the skin and burns of the eyes.

For chemical burns to the skin wash away the chemical with large amounts of water. Use a shower or hose, if available, as quickly as possible and for at least five minutes. Remove all clothing from areas involved. Apply a dressing bandage and get medical aid.

First aid for burns to the eye should begin as quickly as possible by thorough washing the face, eyelids, and eye for *at least five minutes*.

After washing the eye, cover the eye with a dry, clean, protective dressing and bandage in place. Make sure the patient does not rub his eye. Get medical help as soon as possible.

BASIC FIRST AID, Book 2, pp. 87 - 180.

BASIC FIRST AID, Book 4, pp. 3 - 40.

QUESTIONS:

1. *What is the treatment for minor burns?*

_____

_____

_____

2. *John has been fishing is the sun all day. His skin is cool and wet and he feels weak. What should be done?*

_____

_____

_____

****

FROSTBITE

Frostbite will occur chiefly on the nose, chin, cheeks, ears, fingers, and toes. The extremities away from the heart are the most susceptible to frostbite.

The best way to avoid frostbite is to spot its coming. If you are out in the cold, you should employ the buddy system and inspect each other's faces for signs of the white patch that indicates the start of frostbite.

The proper treatment for frostbite is to heat the affected part up as quickly as possible without the use of direct heat. Frostbitten hands should be placed in lukewarm water. If no lukewarm water is available, body heat should be used. Frozen fingers can be placed under one's armpits to provide warmth. Frozen noses and cheeks can be covered with warm scarves and blankets.

DO NOT rub the frozen parts, as this will damage the frozen tissue. *DO NOT* rub snow on a frozen part.

In case of severe frostbit where the body tissue is frozen solid, do not attempt to thaw out. Bring the victim to the hospital as soon as possible, cover him with warm clothes, and give him warm drinks. *DO NOT* give the patient alcoholic beverages.

BASIC FIRST AID, Book 4, pp 41-70

QUESTIONS:

1. *If blisters form on the frostbite area, they should be broken with a sterile needle. True or False?*

   _____

2. *What should not be done to the frozen parts?*

   _____

   _____

SUPPLEMENTAL:

STANDARD FIRST AID & PERSONAL SAFETY

Chapter 9, 'BURNS', pp. 144 - 153.

Chapter 10, 'FROSTBITE', pp. 160-164.

E. FIRE PREVENTION

OBJECTIVES:

1. The student must be able to outline steps to be taken when a fire occurs.
2. The student must be able to name the three classes of fire and explain their differences
3. The student must be able to name two types of fire extinguishers and explain their effectiveness.
4. The student must demonstrate an awareness of four major fire hazards.

The previous numbered page in the original document was blank

UNIT 2

TOPIC E: FIRE PREVENTION

The best defense against fire is to keep a clean building. The majority of fires start in trash and rubbish piles or stored odds and ends around the house.

A routine check of closets, attics, basements and areas where things are stored is a good first step. Smoke alarms are an excellent preventive measure. Installation of fire extinguishers and knowledge of how to use them is extremely important.

An understanding of the different types of fires and what methods are effective against each should be known. There are steps which are recommended in any fire situation.

There are three requirements for fire:

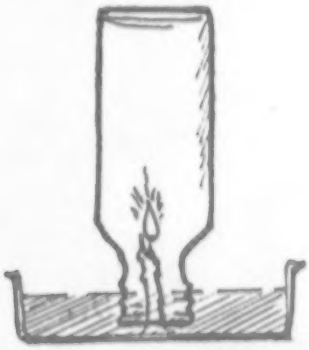
FUEL	OXYGEN	KINDLING TEMPERATURE

a) *Fuel:* In order to have a fire, you must have something to burn. This can be paper, wood, cotton, oil, gasoline, or anything that will unite with oxygen to produce heat and light.

b) *OXYGEN:* Oxygen is the active part of air that *supports* combustion. *'Supports combustion'* means that oxygen is needed for anything to burn. Oxygen is dangerous because in the presence of oxygen many things that were poor fuels become very flammable.

Try This Experiment:

Put a lit candle in an inverted jar of air placed in a pan of water and time how long it takes for the candle to go out. Record the time here:



Time to go out in air:

_____

c) *KINDLING TEMPERATURE:* The third requirement of combustion is enough heat to have the material catch fire. Gasoline has a very low kindling temperature, whereas fuels such as coal have a much higher kindling temperature and must be heated before they will start to burn.

Extinguishing Fires:

If *any one* of the three requirements for combustion are removed, then the fire will go out.

For example: *HOW DOES WATER PUT OUT A FIRE?*

Water puts out a fire two ways. First, the water cools off the fire until the fire is below its kindling temperature. Secondly, the water coats the fuel and prevents air from getting to it.

WITH NO HEAT OR OXYGEN, THE FIRE GOES OUT.

Other fires can be put out by removing the source of fuel to the fire. This is what happens when you turn the gas jet off on a gas stove.

When a fire has started in a house, there are several steps that should always be taken:

1) Get everyone out of the burning room and out of the house.

2) Shut all the windows and doors.

3) Send for assistance where possible.

4) Try to put out the fire with whatever means available.

There are basically three types of fire and three types of fire extinguishers.

The first and most common is the *CLASS 'A'* fire, whose fuel is wood, paper, trash, clothing, or mattresses.

The *CLASS 'A' fire extinguisher* is water from a hose or bucket or from a portable extinguisher. This type of fire extinguisher may have things added to the

water to help figh chemical fires.

Class 'B' fires are fueled by liquids, chemicals, and petroleum products. They include kitchen grease, cooking oil, and gasoline. The best extinguisher for the *CLASS 'B'* fire is the *CO_2 extinguisher*. The *CO_2 extinguisher* usually uses a foam that *'puts a lid'* on the fire by keeping out the oxygen. The third type of extinguisher, the *ABC extinguisher* is also effective. The *ABC extinguisher* uses a dry chemical method. *WATER SHOULD NEVER BE USED ON A CLASS 'B' FIRE*.

The electrical fire is the *Class 'C' fire*. The first step in putting out an electrical fire is disconnecting the electricity. Pull the plug, unscrew the fuse, or trip the circuit breaker. Both the *CO_2* and *ABC* extinguishers are effective against a *CLASS 'C'* electrical fire.

	CLASS A	*CLASS B*	*CLASS C*
Cause:	*Wood, Paper, Trash, Clothing*	*Gas, Oil, Chemicals*	*Electricity*
Extinguisher:	*Type A: Water*	*CO_2, ABC*	*ABC, CO_2*

If your clothing is on fire, deal with it the same way as you would deal with any victim's clothing fire:

1)Don't run.
2)Get on the ground or floor.
3)Smother the flames to prevent deeper burning: roll on the ground or roll in a blanket, rug, coat or anything that is not more flammable than the clothing (obviously not a gauze curtain). Be sure to keep the victim's head outside the covering.
4)Remove clothing. If it sticks, leave it alone.
5)Wrap any burned part of the body in a clean, dry cloth (a sheet or towel) - the cleaner, the better.
6)The victim should remain lying down, calm and warm.
7)If burns are serious, treat for shock as follows: a)Keep the victim lying down; b)Elevate the legs and

hips and loosen the clothing; c)Keep the victim warm, but do not overheat. Wrap blankets completely around his body, over and under; d)Try to get medical help.

HAZARDS:

Over fifty percent of all home fires in the U.S. are caused by smoking. They are caused by cigarettes, cigars, and pipes (or matches and ashtrays), that smokers thought were out.

1)Keep all matches out of the reach of small children.

2)Have many ashtrays, and keep them clean.

3)Be sure your matches and cigarettes are out before you discard them.

4)Don't smoke in bed.

5)Don't strike matches in closets, garages, or other places where flammable materials, dust or vapors may be ignited.

Electrical appliances are a chief cause of fires. Don't overload circuits. 1650 to 1700 watts is the maximum that can be put on one circuit. As a rule, use only one heat consuming device on each circuit....one kettle, one toaster, or one heater. *NEVER* replace a fuse with one larger than the original. Almost all circuits require 15 amp fuses. If they blow continually, get an electrician to check the wiring.

Your heating plant can be a fire hazard. Your chimney should be cleaned regularly. All pipes and fittings should be air tight. A loose chimney pipe may allow deadly carbon monoxide gas into the house. Stoves should be cleaned regularly and furnaces at least once a year. You'll find that cleaning your furnace will pay off in lower heating costs.

STANDARD FIRST AID & PERSONAL SAFETY, pp. 153-159.
BASIC FIRST AID, Book 4, pp. 77 - 128.
BASIC FIRST AIR, Book 2, pp. 181 - 232.

QUESTIONS:

1. *What are the three requirements for fire?*

_____

_____

2. *What are the three classes of fire and what does each burn?*

_____

_____

_____

3. *What class fire should you never use a CLASS 'A' extinguisher on? Why?*

_____

_____

_____

_____

4. *List four major fire hazards:*

_____

_____

_____

_____

SUPPLEMENTAL:

FIRE & YOU	*Owen, Howard R. (IMC, Kodiak)*
PROJECT DISCOVERY	*Medical Emergency Services Activity 5:'Transporting Patients in Emergency Situations'*

'FIRE', FS 3 *Kodiak IMC*

99

OBJECTIVES: 1. The student must give treatment for overdose of aspirin and most medicines.

2. The student must be able to explain when <u>not</u> to induce vomiting.

3. The student must be able to give five common poisons found around the house.

UNIT 2

TOPIC F: POISON

A poison is any substance, solid, liquid, or gas that tends to impair health or cause death when introduced into the body or onto the skin surface.

It is very important to have an understanding or poison treatment, especially in isolated communities where medical attention is not always available. Aspirin overdoses is the most common cause of poisoning in the United States. Mixing alcohol and drugs is another frequent cause which can be fatal.

The objective in treating poisoning by mouth is to dilute or neutralize the poison as quickly as possible; to induce volmiting (except when corrosive poisons are swallowed, or if victim is unconscious or having convulsions); to maintain breathing and to seek medical assistance as soon as possible.

The following are some precautions that should be taken with medicines:

1)All medicines should be kept in locked cabinets; they should never be left near a sick bed, and should be returned to the cabinet immediately after use.

2)Never use medicine from an unlabeled bottle even if you remember what it contains. Never refer to medicine as candy to a child. Throw away unused medicine after a year.

3)Dispose of liquid medicines down the toilet. Burn pills and solid medicines.

4)Detergents, polishing agents, lye, insecticides, and cleaning agents should be stored in cabinets high above the reach of children.

The following charts contain information needed to understand the treatment for certain kinds of poisoning. Your reading in *BASIC FIRST AID* will further explain this.

WHAT TO DO WHEN

You do know that the victim has not swallowed a strong acid, strong alkali, or petroleum product, but do not have the original container.	*You do not know what poison the victim swallowed.*
1) Dilute the poison with water or milk.	*1) Dilute the poison with water or milk.*
2) Induce vomiting (except for strong acids, strong alkalis, and petroleum products).	*2) Try to find out what poison has been swallowed (look for the original container).*
3) Get medical help immediately.	*3) Get medical help immediately.*

TYPES OF POISONS FOR WHICH VOMITING SHOULD NOT BE INDUCED:

Types of Poison	Diluting Fluids (one glass)	Neutralizing Fluid (adult, 3-4 glasses; child, 1-2 glasses)	Demulcent (several glasses but do not induce vomiting)
Strong acid (i.e., toilet bowl cleaner)	Water or Milk	Milk of magnesia or other weak alkali with water	Milk, olive oil, or egg white
Strong alkali (i.e., drain cleaner)	Water or Milk	Vinegar or lemon juice, mixed with water.	Milk, olive oil, or egg white.
Petroleum product (i.e. kerosene, gasoline, furniture polish)	Water or Milk	None	None

102

BASIC FIRST AID, Book 1, pp. 261-372

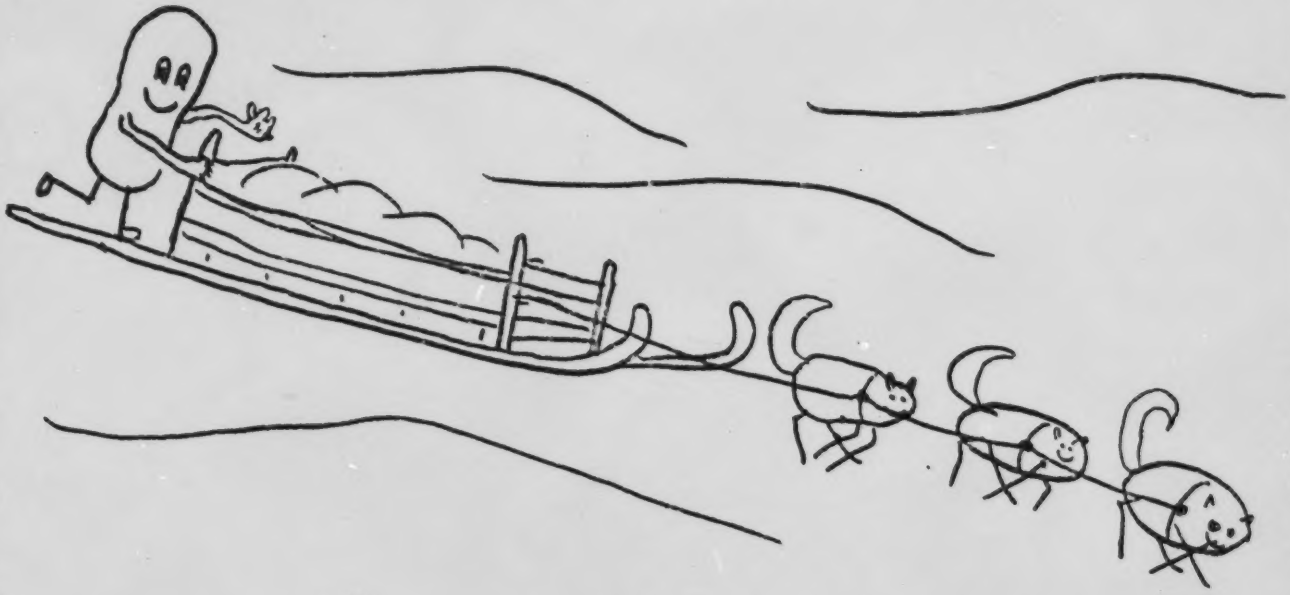
Answer Summary Questions 1-12 on separate sheet of paper.

SUPPLEMENTAL:

STANDARD FIRST AID & PERSONAL SAFETY, Chapter 7, pp. 95-119.

Poison Information Center - Seattle, WA (Dial 101 (206) 634-5252)

G. OUTDOOR SURVIVAL



OBJECTIVES:

1. The student must be able to give several precautions for outdoor travel.
2. The student must be able to give several methods for keeping warm outdoors.
3. The student must be able to list three warning signals for hypothermia and explain its treatment.

The previous numbered page in the original document was blank

UNIT 2

TOPIC G: OUTDOOR SURVIVAL

'BE PREPARED!' This old Boy Scout slogan makes a lot of sense. Anytime you go into the bush or onto the water, you should *'BE PREPARED'* for the worst. There are several steps which will increase your chances of survival and rescue if you become lost.

1)Let people know where you're going and when you expect to return.

2)Always carry more food and clothing than you think you'll need.

3)A waterproof match container, raingear, and signal device (whistles, mirror, etc.) should always be included.

If you become lost, the most important thing is,

DON'T PANIC!

-Think; use your head.

It is very important that you conserve your energy as much as possible.

a) Look for shelter:
-Dig out a snowhouse;
-Find some natural cover, such as a cave or overhang.

b) Create a signal:
(SOS is the most common distress signal)
-Tramp it in the snow in hugh letters;
-Draw it in the sand;
-Make it in a clearing out of branches.

(If a plane sees this signal, the pilot will immediately send for help.)

c) Build a fire:
(Three fires in a triangle indicate distress.)

INTERNATIONAL MOUNTAIN DISTRESS SIGNAL: This distress signal is six flashes of a signal mirror, six whistles or waves in a minute. This is followed by a minute of silence, then the signal is repeated.

BOAT DISTRESS SIGNAL: The boat distress signal is a square flag with anything looking like a ball over or under the flag.

MORSE CODE: The Morse Code for SOS is three short, three long, three short: ···---···

Again: *DON'T PANIC!*

After you have found shelter and attempted a signal, then try to get your bearings. Conserve your food and energy. Keep dry and warm.

One of the most dangerous threats in the outdoors is *HYPOTHERMIA*.

HYPOTHERMIA is the cooling off of the body to a dangerous level. It is sometimes called exposure. Hypothermia can occur in temperatures well above zero. A combination of wind, wetness, and cold can chill a person to a dangerous level without their knowing it.

When the body becomes cold, blood is rushed to the vital organs. This makes the extremities (hands, feet, ears, etc.) become chilled. The chilling spreads throughout the body. Some symptoms of hypothermia follow:

Shivering.
Slow reactions.
Stumbling, clumsiness.
Dilated eyes.
Confusion.
Difficulty in speaking.

Once hypothermia is detected, immediately react to it. The patient must be warmed. Remove all wet clothing. If warm water is available, place the victim in warm water for five to ten minutes. Dry completely and wrap in blankets or sleeping bags. Another person's body heat is especially effective. Both people should be naked and pressed together as close as possible.

Warming the chilled body is the key point. The patient should be kept bundled up for at least six hours and, where possible, medical attention should be sought.

QUESTIONS:

1. *You have been out hunting and have gotten lost. It is late afternoon, lightly raining, and about 40 degrees. What should you do? (Outline the steps to be taken.)*

2) *What should you do before going on an outdoor trip?*

_____

_____

_____

_____

_____

3. *What items should always be taken?*

_____

_____

_____

_____

4. *List three symptoms of hypothermia:*

_____

_____

_____

5. *If a person is suffering from hypothermia, what steps should be taken?*

_____

_____

_____

6. *What is the Boat Distress signal?*

_____

_____

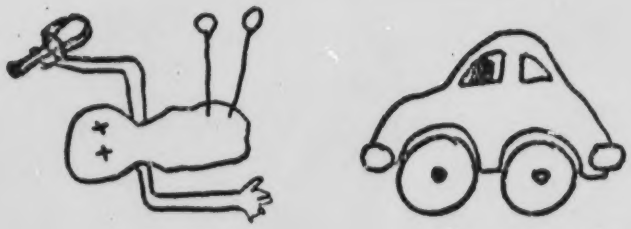
SUPPLEMENTAL:

BASIC FIRST AID, Book 4, pp. 3-70.

SAFETY NOTES FOR THE NORTH PACIFIC FISHERMAN, Marine Advisory Bulletin No. 3, University of Alaska, Sea Grant.

THE WILDERNESS HANDBOOK, Petzoldt, Paul.

H. HIGHWAY SAFETY



OBJECTIVES:

1. The student must know the points describing a good driver.
2. The student will demonstrate an understanding of Alaska's "Points" system.
3. The student must know the required equipment for automobiles and motorcycles.
4. The student must know the shape and purpose of the stop sign, yield sign, regulatory sign, and warning sign.

UNIT 2

TOPIC H: HIGHWAY SAFETY

'DRIVING IS A PRIVILEGE, NOT A RIGHT.'

Highway safety is not just knowing how to drive a car down the road. You must know how to drive in various weather conditions, what different signs mean, how to maintain your vehicle, when NOT to drive, and what the highway laws state.

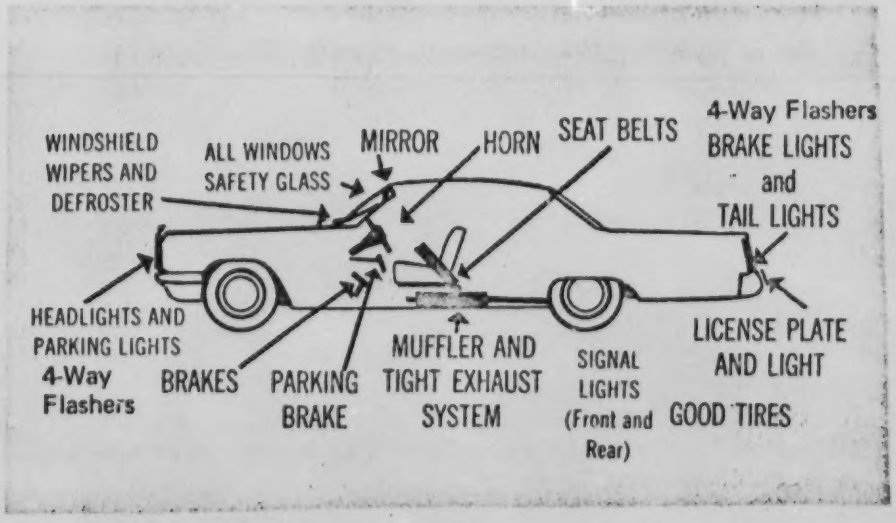
DRUNK DRIVING is the No. 1 KILLER of TEENAGERS in AMERICA!

DRINKING and DRIVING do not MIX!

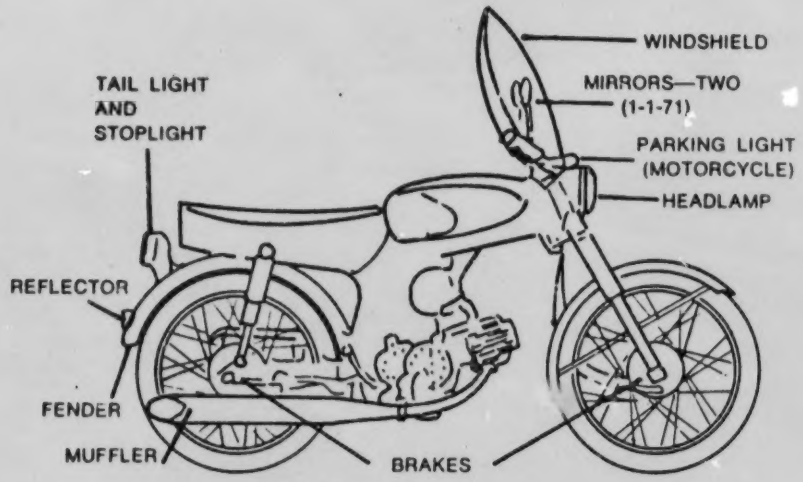
A GOOD DRIVER:

1) *Is constantly aware of traffic conditions around him.*
2) *Drives as required by law and traffic conditions.*
3) *Drives courteously and defensively.*
4) *Keeps his vehicle mechanically safe.*
5) *Is physically competent and mentally alert.*

One of the best ways to avoid accidents and make sure of your own safety is to have your vehicle in proper order. Your car must have the following equipment working and in proper adjustment:



Motorcycles must also meet strict safety requirements if they are to be used on Alaska's streets and highways. They are:



SPECIAL PROVISIONS:

WINDSHIELD: required unless operator is wearing approved goggles or transparent face shield. Must rise at least 15 inches above handlebars.

HANDLEBARS: must be no more than 15 inches higher than the seat or saddle.

MUFFLER: cannot be louder than the original muffler installed for highway use.

HEADLAMP: must be multiple beam on a motorcycle. Can be either multiple or single beam on motorscooter. Beam indicator required if multiple beam.

FENDERS: required on rear to reduce wheel spray to the rear.

SEAT: permanently attached seat for passenger is required in order for passenger to ride.

S2H

A WORD ABOUT 'POINTS'

Alaska has a new law aimed squarely at accident prevention through identification, control and rehabilitation of recognized problem drivers. It works this way:

1) *Every moving violation will have a designated value, from one to twelve points.*

2) *Those violations contributing to greater accident potential will carry higher point values.*

3) *Upon the acquisition of a determined number of points, the violator will be notified and warned to take a hard look at his driving habits.*

4) *Additional pointaccumulations will require a personal interview with a Driver Improvement Examiner. The Examiner may recommend enforcement of a wide range of requirements or restrictions in an effort to head off more serious and lasting driving difficulties.*

5) *"Credits" may be earned under the new law for violation-free driving.*

6) *The accumulation of 12 points in 12 months or 18 points in two years requires the mandatory suspension or revocation of the driving privilege, regardless of the hardships involved.*

7) *No interim license is available should suspension or revocation of the driving privilege be required.*

If you are convicted of, or forfeit bail, for a moving traffic violation, points are assessed on your driving record based on the following point schedule.

DRIVER'S LICENSE POINT ASSIGNMENT

Type of violation:	Point Value:
Operating a motor vehicle while privilege to do so is suspended or revoked	12
Driving while under the influence of intoxicating liquor or narcotic or dangerous drugs	10
Reckless driving	10

Type of violation:	Point Value:
Fleeing or attempting to elude a Police Officer	10
Speed Contest.....Racing	10
Leaving the scene of an accident	9
Negligent driving	6
Failure to yield to authorized emergency vehicle	6
Failure to stop for school bus while bus is loading or unloading	6
Failure to obey official traffic control devices in school zone, playground crosswalk, or park	6
Careless driving	4
Following too close	4
Failure to stop or yield	4
All other moving violations	2
Violation of oversize or overweight permits pertaining to restriction on hours of operation	3
SPEEDING:	
In school zone or playground crosswalk	6
3 to 9 mph over limit	2
10 to 19 mph over limit	4
20 mph or more over limit	6
Violation of oversize or overweight permits pertaining to restriction of speed:	
3 to 9 mph over limit	2
10 to 19 mph over limit	4
20 mph or more over limit	6

In order to get a drivers license in Alaska, you must show you understand both the laws and how to drive. The State of Alaska Driver's Manual contains all the information you need to know concerning regulations, safety tips, insurance laws, and driving improvement. The Motorcycle Operator Manual is also put out by the state and is required reading for people wishing to get a motorcycle endorsement.

The following are the major sign groups:

STOP SIGN: *white on red or black on yellow.*

1) Make a complete stop even with sign or stop line. Stop in back of crosswalk.
2) Look both right and left for traffic and pedestrians. Yield right-of-way.

113

YIELD SIGN: *red on white.*

1) Slow down as required when approaching this sign.
2) Look both left and right and yield to traffic and pedestrians.
3) Stop required when necessary to avoid pedestrian or traffic on protected street.

INFORMATION SIGN: *red on white.*

This sign is on the right-hand side of the roadway facing traffic entering the roadway or ramp in the wrong direction. A white on red *WRONG WAY* sign may be placed further down the prohibited direction.

REGULATORY SIGN: *black on white.*

1) Regulatory signs indicate an instruction for the driver which must be understood and obeyed. They are backed by state statute or local ordinance. Violation of the instructions can be the grounds for conviction of the violator for disobeying traffic regulations.
2) Obey the law indicated.

WARNING SIGN: *black on yellow*

1) Warning signs warn of actual or potential special conditions ahead.
2) Extra caution should be observed at all warning signs.
3) Most warning signs indicate a decrease in speed.
4) Read and adjust your driving to the situation.

QUESTIONS:

1. *Make three statements that describe a good driver:*

_____

_____

_____

2. *If you had been ticketed for negligent driving, failure to stop or yield, and following too close in the first two years after getting your license, would your license be suspended:*

_____

3. *When is a motorcycle windshield not required?*

_____

4. *What is the number one cause of teenage death?*

_____

5. *Match the following:*

____*Regulatory Sign*

____*Stop Sign*

____*Warning Sign*

____*Yield Sign*

A.

B.

C.

D.

SUPPLEMENTAL

115

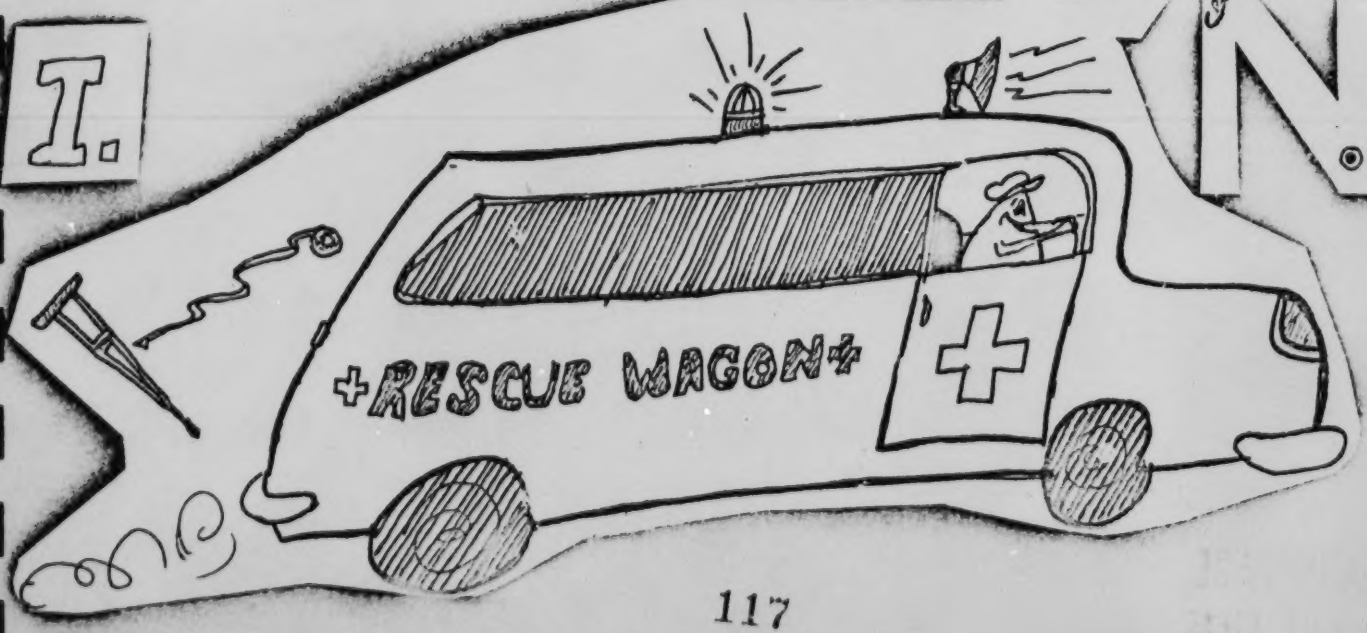
SUPPLEMENTAL:

STATE OF ALASKA DRIVERS' MANUAL

MOTORCYCLE OPERATORS MANUAL, State of Alaska

ACTIVITIES SECTION

I.



OBJECTIVE:

THE STUDENT WILL LEARN THE VOCABULARY RELATED TO THE UNIT ON FIRST AID.

FIRST AID WORD ACTIVITY #1

1.	Rescue	____	a. Person who was hurt
2.	Demonstrate	____	b. Show
3.	Delay	____	c. Throw up
4.	Tilting	____	d. Bring back to life
5.	Vomit	____	e. Slow down or postpone
6.	Mucous	____	f. Save
7.	Victim	____	g. Breathing
8.	Revive	____	h. Liquid from membrane
9.	Respiration	____	i. Tipping
10.	Artificial	____	j. Not natural

After the word on the left, write the letter of the correct definition. Use the dictionary to look up the words you don't know.

****

FIRST AID WORD ACTIVITY #2

Use the words in the left hand column in the sentences below:

1. He was so sick he started to _____.
2. The car was _____halfway over the cliff.
3. The _____of the auto accident was lying in the road.

118

The previous numbered page in the original document was blank.

4. The flowers on the desk are_____.

5. The accident caused them to _____their trip.

6. Use this handkerchief to blow the _____from your nose.

7. The doctor checked his_____to see of he were alive.

8. We attempted to _____him with artifical respiration.

9. I will_____how to check someone's pulse.

10. The Coast Guard came to _____the drowning man.

****

FIRST AID WORD ACTIVITY #3

If you missed 3 or more words, from Activity 2, study the ones you missed in the dictionary. Do Activity 3 writing different forms of the same words in the blanks.

distinguished	applying	supplies	labels
diagnostic	acquaintance	identification	
diagrams	expression	location	

1. Look at the _____on the cans.

2. His gray hair made him look very _____.

3. "Good grief!" was his favorite_____.

4. This _____test tells us what we need to study.

5. He stopped the bleeding of the wounded hand by _____ pressure to the arm.

6. The campers made a trip into town to buy_____.

7. He enjoyed meeting Adam Jones, a childhood _____.

8. The policeman stopped the man and asked to see him_____.

9. There are 3 _____in the book showing how the engine works.

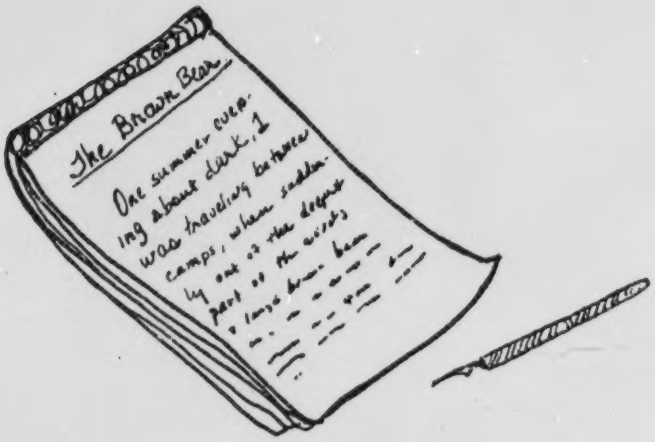
10. The hunters moved to a new_____where the game was better.

FIRST AID WORD ACTIVITY #4

TEAM UP WITH A FRIEND. LEARN TO SPELL THE WORDS IN THE TWO LISTS. CHOOSE ONE OF THE TWO ACTIVITIES:

1) Use each word in a sentence of your own. Have a friend read your sentences to see if they're okay.

2) Use 5 or more of the words in a story. Turn it in to your teacher. Maybe you can read it to the class.



FIRST AID WORD ACTIVITY #5

Look up these words in a dictionary. Write one good definition opposite each word. Write the pronounciation also.

1. insecticide _____

2. elevate _____

3. fracture _____

4. immobilize _____

5. nauseous _____

BEST COPY AVAILABLE

6. transfusion _____

7. pulse _____

8. semi-conscious _____

9. internal _____

10. reassure _____

****

FIRST AID WORD ACTIVITY #6

Use each word in the list in one of these sentences:

1. Shock is often caused by either external or _____ breathing.

2. The _____ he was using to kill mosquitoes made his eyes burn.

3. If the foot is broken, we must _____ it.

4. He was unconscious and suffering from a skull _____.

5. He became _____, aware of some of the things going on.

6. As she ran, her _____ beat faster and faster.

7. _____ his head and give him a drink.

8. He lost so much blood that the doctor gave him a _____.

9. He was so ill that the sight of food made him _____.

10. The doctor spoke quietly to _____ the patient.

121

FIRST AID WORK ACTIVITIES #5 & #6 ANSWER KEYS:

1. insecticide: (in sek' ti sīd): chemical for killing insects.
2. elevate: (el' ē vāt): to raise.
3. fracture: (frak' tur): break or crack.
4. immobilize: (im mō' bi līz): make motionless.
5. nauseous: (nô' shus) or (nô' shē us): sick to the stomach.
6. transfusion: (trans fū' zhun): blook transfer.
7. pulse: (puls): regular throbbing in arteries.
8. semiconscious: (sem' i kon' shus): partly awake.
9. internal: (in tur' nal): inner.
10. reassure: (rē' ə shoor): to restore confidence.

1. Internal
2. Insecticide
3. Immobilize
4. Fracture
5. Semiconscious
6. Pulse
7. Elevate
8. Transfusion
9. Nauseous
10. Reassure

FIRST AID WORD ACTIVITY #7

MAKE FLASH CARDS:

Using blank cards or sheets of construction paper, make flash cards of the 10 words you looked up, putting the word and pronounciation on one side, and the definition on another. Have a friend show you one side of the card while you tell him or her the information on the other side. If another person has already made flash cards, borrow them and use them till you have learned the words and what they mean.

EXAMPLE:

SIDE 1	SIDE 2
fracture (frăk' tŭr)	Break or Crack

DICE SPELLING GAME:

With another student, practice the 10 words by throwing dice. Take turns rolling the dice. If you throw a 5, spell 'nauseous', for instance. If you throw a 7, spell 'pulse'. Each correct answer equals one point. An 11 or 12 thrown may give the player a bonus point and let him or her throw the dice again.

Other rounds to the game might include definitions or use in a sentence.

FIRST AID WORD ACTIVITY 8

You have studied numerous accidents and what to do about them. Here is a matching game of problems you haven't studied and first aid that might apply. Do this activity, then follow the directions at the bottom of the page.

Put the letter preceding the treatment with the correct type of injury.

WHAT'S WRONG		WHAT TO DO
1. splinter in the hand	____	A. Use calamine lotion or alcohol to cool the itching.
2. insect bite	____	B. Remove with edge of clean handkerchief.
3. cavity in tooth	____	C. Pull out with tweezers.
4. something in the eye	____	D. Soak in hot water.
5. aching feet	____	E. See a dentist.

Using the above activity as a pattern, make up your own game of the more serious ailments you have studied in this unit and the first aid remedies recommended. Make a key of correct answers for the game. Try it out on the next student who studies the first aid unit.

FIRST AID WORD ACTIVITY 9

Make a list of folk treatments which your parents and grandparents used.

FIRST AID WORD ACTIVITY 10

Write a paragraph about "THE MOST SERIOUS ACCIDENT I HAVE EVER SEEN." What caused the accident? What was done about it?

FIRST AID WORD ACTIVITY 11

Make a list of "Ten Dangerous Occupations" and what makes each dangerous. If your teacher is willing, invite someone to come to the class to talk about his or her occupations and what the dangers are. Since many accidents occur in the home, don't overlook a housewife as a possible resource teacher.

FIRST AID WORD ACTIVITY 12

Draw or paint five posters on "The Five Best Ways to Get Hurt in the Village". Include instructions on what to do in case the injury occurs. Find out if you can display your posters in the store or post office or some other public place.

FIRST AID WORD ACTIVITY 13

Over the next four weeks, keep a record of all the illnesses or accidents that occur in the village. What caused each? What was done in each case?

UNIT TEST A

UNIT 2: FIRST AID AND ACCIDENT PREVENTION RESULT

CRITERIA 80/100

Marks

(3) 1. How do you stop bleeding from a cut leg?

_____

(3) 2. What is a closed wound? _____

_____

(3) 3. What are three signs of shock?

a. _____ c. _____

b. _____

(3) 4. What are three common causes of shock?

a. _____ c. _____

b. _____

(3) 5. What is usually the best body position for a person in shock?

_____

(3) 6. How long should you wait before beginning artificial respiration?

_____

(3) 7. How long should you continue giving artificial respiration?

_____

(3) 8. List the four most important steps in giving artificial respiration:

a. _____

b. _____

c. _____

d. _____

(3) 9. Is a first degree burn or a third degree burn more serious?

_____

(3) 10. What is the treatment for a minor burn?

_____

(3) 11. What are two things not to do in treating frostbite?

a. _____

b. _____

(3) 12. What drug is the most common cause of poisoning?

_____

(3) 13. When should vomiting never be induced?

_____

(3) 14. What are three things required for fire (combustion)?

a._____ b. _____ c. _____

(3) 15. What is the best defense against fire?

_____

(3) 16. What type of fire is Class A:_____

Class B:_____

Class C:_____

(3) 17. What are the first two things to do if a house is on fire?

a._____ b._____

(3) 18. What three things should you always carry in the bush?

a. _____ b._____

b. _____

(3) 19. What are three signs of hypothermia?

a._____ b._____

b._____

ESSAY: Explain in complete sentences or complete outline form what FIRST AID you would give in the following situations and the order in which you would give it.

(16) 1. Leona has fallen from a tree. She is badly cut above the eye and is unconcious. She is not breathing.
(Teacher Judgement)

(16) 2. Benny-bo has been badly burned in a house fire. His clothes are charred and sticking to his skin. His eyes are dilated and his breathing and pulse are rapid. You have helped him out of the house and he is standing twenty feet from the flames. What should you treat for? How would you do it? (Teacher Judgement)

(3) 20. What is the treatment for hypothermia?

_____

_____

(3) 21. How many "points" in one year does it take for mandatory loss of driver's license?

_____

(4) 22. Match the signs:

_____Regulatory

_____Stop

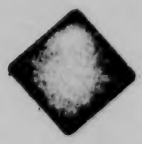
_____Yield

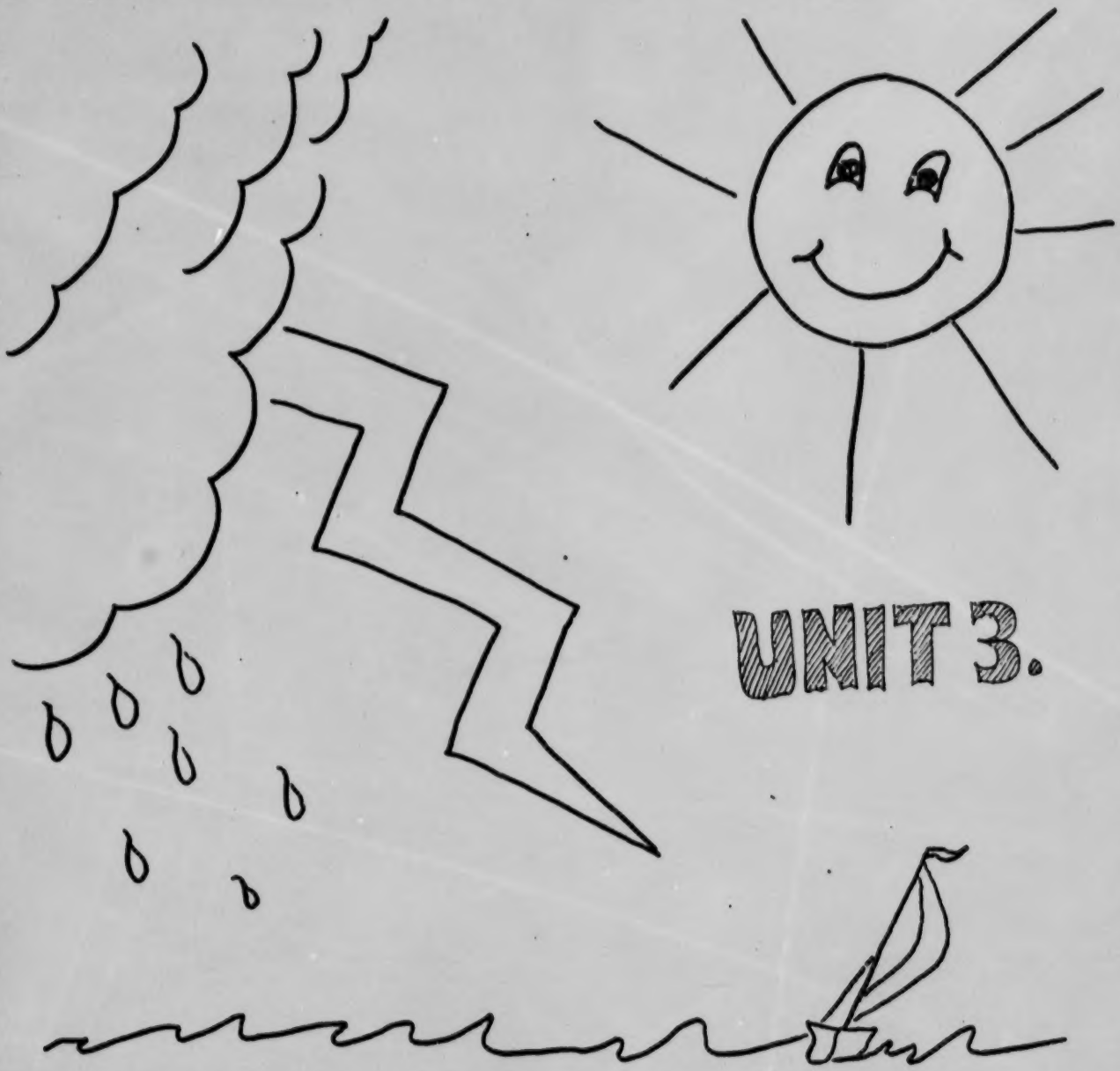
_____Warning

A.

B.

C.

D. 

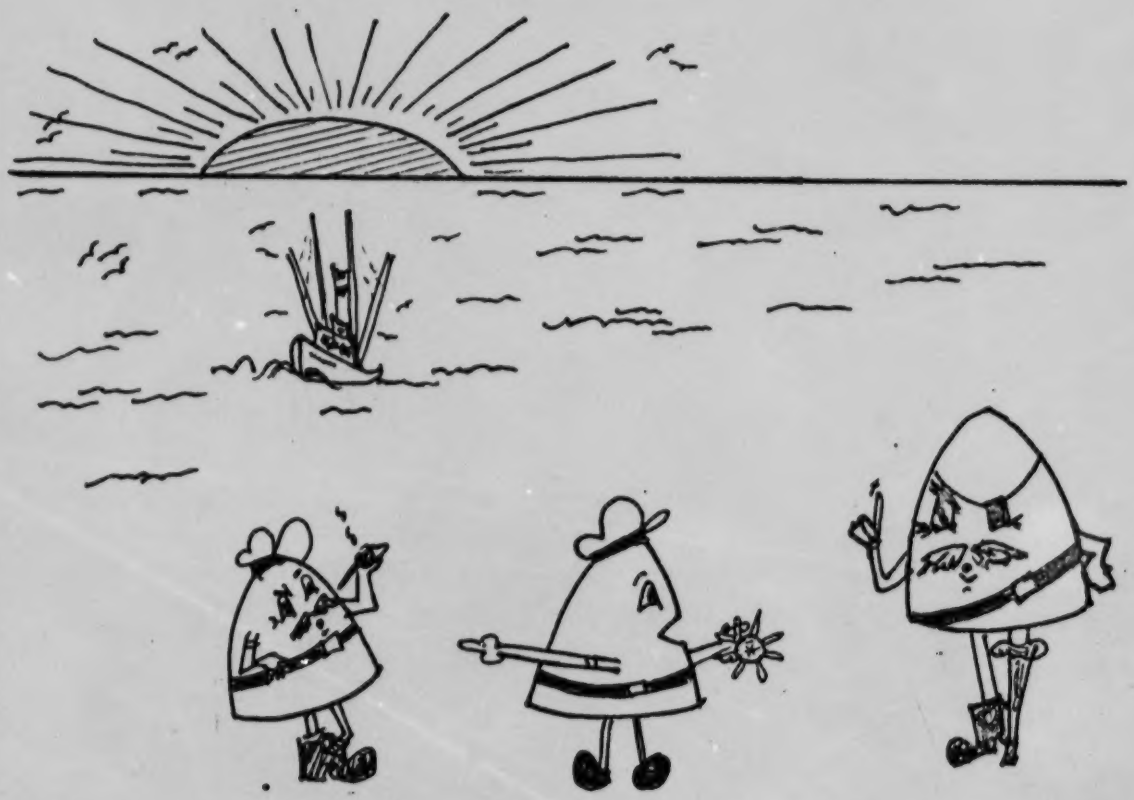


UNIT 3.

WEATHER

"In nature's infinite book of secrecy
A little I can read."
— Shakespeare

A. WEATHER LORE



OBJECTIVES: 1. The student must be able to explain the significance of weather lore.

UNIT: 3 WEATHER

TOPIC A: WEATHER LORE

'Red sky in the morning,
Sailors take warning;
Red sky at night,
Is a sailor's delight.'

This old mariner's chant has been used to predict weather for hundreds of years. Like many such weather sayings it is accurate an amazing percentage of the time. In this topic we will look briefly at some of the lore surrounding weather prediction and see if there is a foundation for such forecasting.

Benjamin Franklin once said, *'Some are weather-wise; some are otherwise....'*. To be otherwise in the past was usually to be in trouble. Those who developed our rich stock of weather sayings and proverbs engaged in a working partnership with nature. To forecast weather was not a matter of choice but one of necessity. The weather determined when to sail, when to plant, and when to travel.

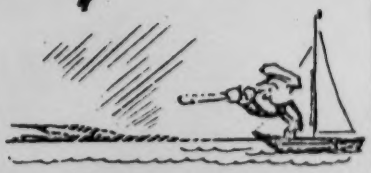
'When air gets light,
The glass falls low.
Batten down tight
For the winds will blow.'

-Old Sea Chantey

Until the twentieth century everyone took these bits of weather wisdom in all seriousness, for life depended on their predictions. If misguessed, sailors were caught by storms with sails fluttering, farmers were caught with crops still unharvested, and hunters would miss their game. Weather lore was serious business to these people whose livlihood depended on the whims of nature. It was, in fact, all the security they had to live by.

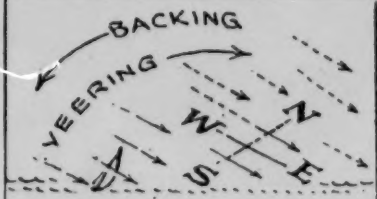
Weather Sayings of the old Sailors

DEW INDICATES A GOOD DAY AHEAD: A DRY MORNING IS SIGN OF SHOWERS.

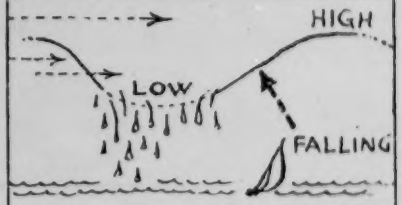


DISTANT SHORES LOOM UP "NEARER" BEFORE RAIN BECAUSE OF THINNING OF THE AIR.

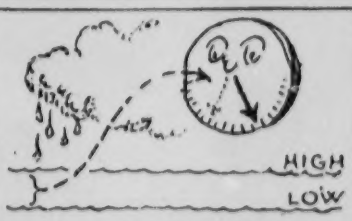
LARGE HALO AROUND THE MOON INDICATES CIRRUS CLOUDFORM & WARM FRONT RAIN.



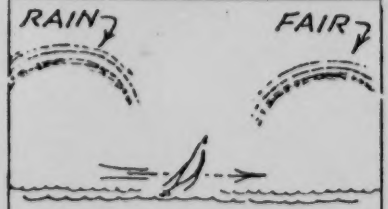
A VEERING WIND IS SIGN OF FAIR WEATHER: BACKING WIND MEANS RAIN.



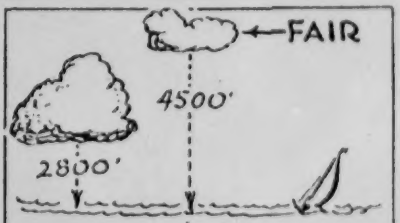
FALLING BAROMETER INDICATES NEARING "LOW" AREA, WITH WINDS AND RAIN.



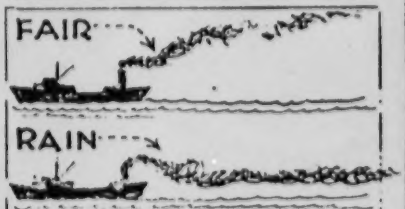
RAIN IS MOST FREQUENT AT THE TURN OF THE TIDE (IF AIR IS HUMID)



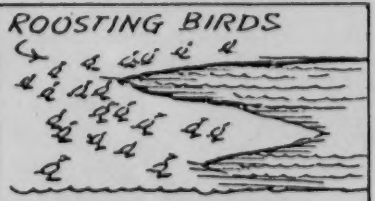
RAINBOW TO WINDWARD, RAIN AHEAD. RAINBOW TO LEEWARD, RAINS END.



HIGHER THE CLOUDS, FINER THE WEATHER. LOWERING CEILINGS FORETELL A RAIN.

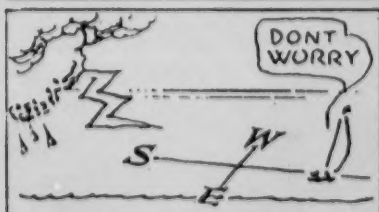


SMOKE THAT CURLS DOWNWARD AND LINGERS, MEANS A NEARING STORM.



THINNING AIR IS HARDER TO FLY IN. BIRDS "SIT IT OUT" BEFORE A STORM

SKY FULL OF WEBBY CIRRUS FORETELLS DISTURBANCE AND RAINS ON ITS WAY



LIGHTNING FROM THE W. OR N.W. WILL REACH YOU; FROM S. OR S.E WILL PASS

Meteorology is the science of weather forecasting. Meteorology and weather lore forecasting have a common heritage. They examine the same phenomena and differ mostly in the indicators they use. The meteorologist consults a few instruments and some tables of data to make his forecast. The weather-wise person uses dozens of more subtle, yet more readily available indicators at the same moment. Being weather-wise means more than never getting rained on. It means being sensitive to nature. The weather-wise individual is aware of the color and texture of the sky, the dew on the grass, the flight of birds, the chirping of crickets, and the very taste of the wind.

Modern scientists, both climatologists and biologists, far from dismissing these observations have learned from them. The robin nesting before a storm, for example, has been given some study. Two reasons are given by biologists. First, the low-pressure air which accompanies a storm is not as dense as high-pressure air and therefore is harder for birds to fly in. Second, some bird's nests, robins, for one, are so frail that they would be destroyed if the birds were not in them during storms. Nature has given these birds storm sensitivity and biologists have learned from them.

A few years ago a group of weathermen decided to test the accuracy of the legend about the caterpillar known to the early pioneers as the *'Woolly Bear'*. The Woolly Bear was said to be an excellent prophet of winter weather ....the wider his middle brown band, the milder the winter. The fact that scientific men put this bit of folklore to the test is significant, but the fact that the Woolly Bear is still forecasting winters with great accuracy is even more remarkable!

'When the dew is on the grass,
Rain will never come to pass.'

Again, here is another old weather saying that actually has some scientific basis. Dew is the visible droplets of moisture that form on grass, plants, and metal objects in the morning. Dew is formed when the air is chilled after sundown as the earth gives up its heat. To form due, two conditions are necessary: 1)lack of clouds, and, 2)a windless night. A cloud cover would hold down heat and not allow condensation. A night breeze would carry warm air over the ground, again preventing dew from forming. Morning dew thus comes with conditions that are right for a fair weather day. And the opposite:

'When grass is dry at morning light,
Look for rain before the night.'

Certainly many old weather sayings are sheer nonsense. Many, however, are often correct and have established a heritage for the weather-wise. The following topics in the STARS unit will deal with more scientific approaches. Where sayings and proverbs fit they will be included to demonstrate the closeness between our past weather lore and our present meteorological findings.

QUESTIONS:

1. *Are there any weather sayings that you have heard? What are they?*

2. *List three reasons it is sometimes important to be able to forecast the weather.*

3. *What weather 'indicators' do you or people you know sometimes use to predict weather?*

SUPPLEMENTAL:

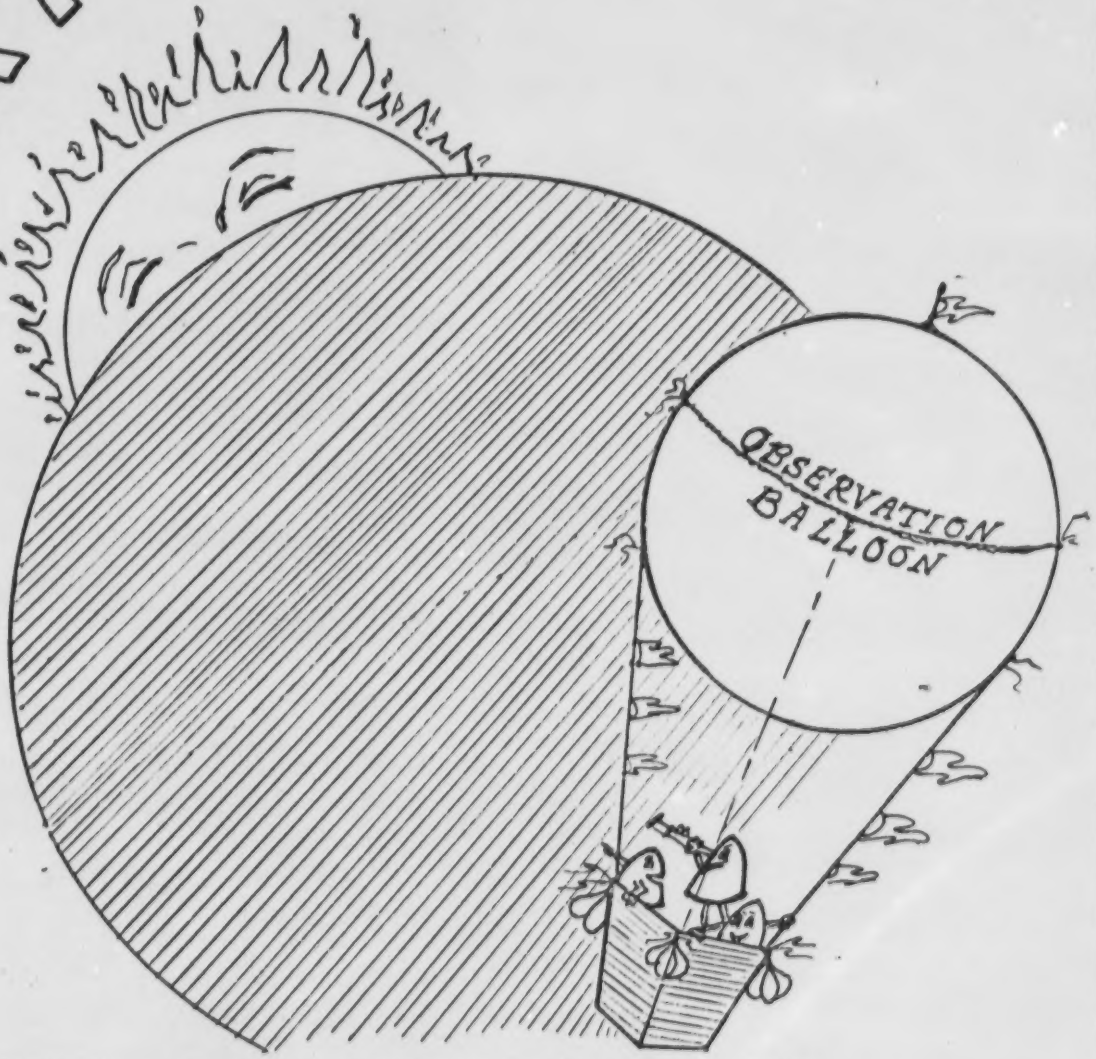
The following books are available through the public library (Kodiak) and will be sent for upon request.

CLIMATE & WEATHER, Flohn, Hermann
INSTANT WEATHER FORECASTING, Watts, Alan

135

ERIC SLOANE'S WEATHER BOOK, Sloane, Eric
WEATHER, Thompson, Philip S., & O'Brien, Robert

B. ATMOSPHERE



OBJECTIVES:

1. The student must be able to name layers of the atmosphere.

2. The student must be able to explain air pressure and the workings of a barometer.

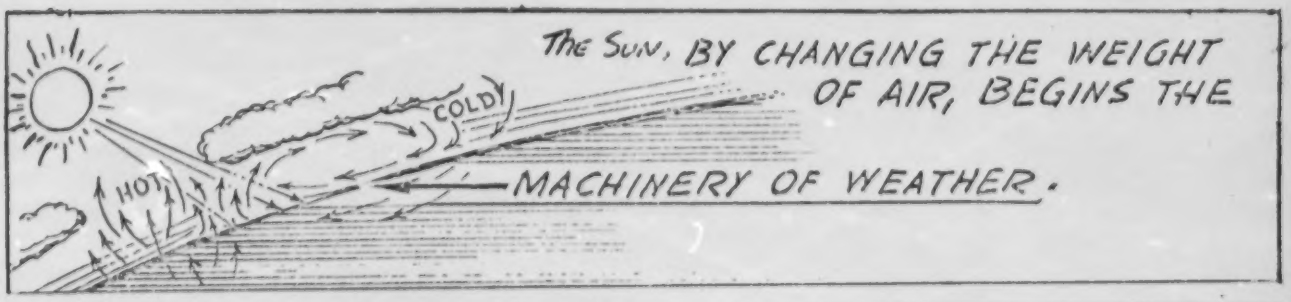
3. The student must be able to explain what air masses are.

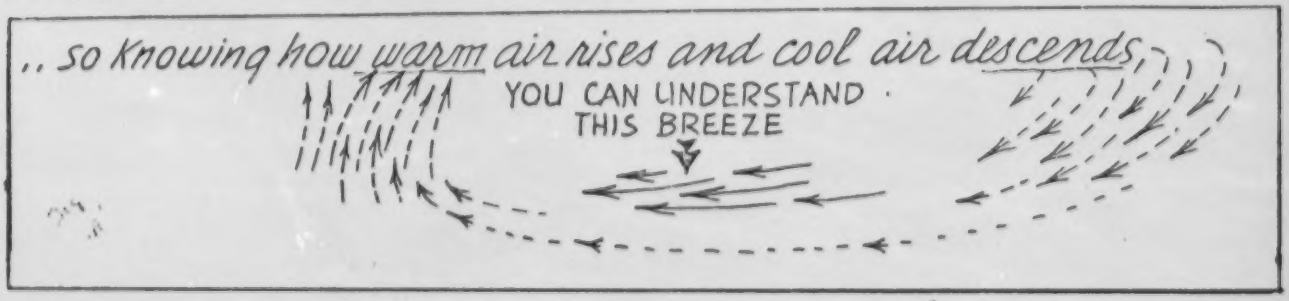
Unit 3: Weather

Topic B: The Atmosphere

The earth is surrounded by a shell of gas called the *atmosphere*. If we were to compare the earth to an orange, the atmosphere would be the skin. The earth moves through space circling the sun. The atmosphere clings to our surface because of the pull of gravity.

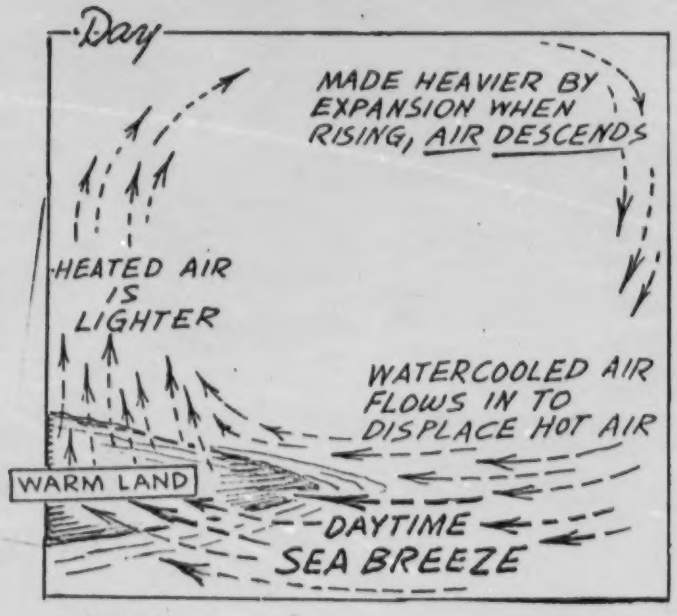
Even though the atmosphere stays around the earth, it still moves freely, sometimes violently. The atmosphere is an invisible mixture of gases called air. The air in the atmosphere is always moving. The reason for the movement is that the air has weight. Cold air is heavier, and as the sun warms it, it rises. This causes a reaction we know as wind.





Cooled air shrinks and becomes denser. The changes in weight cause air to flow this way and that, and new weather to evolve. The land during the day is like a warm stove with most of the air raising chimney-style; it is natural that some air should rush in from the sea to take the place of the rising atmosphere; thus, presto!... a sea breeze!

The previous numbered page in the original document was blank.



Underlying the great variety of weather changes is a pattern of large scale movement over the earth. The basic cause of these planetary winds, or general circulation of the atmosphere, is the greater heating by the sun of the air over the equator, than the air over the poles. The heated air over the equator rises and flows towards the poles. In the polar regions the air cools and sinks, and from time to time flows back towards the equator. Thus;

The grand concepts of weather are really quite simple. Weather is nothing more than the collisions between huge blobs of air, called *air masses*. They behave like giant cars rushing about, and whenever they crash together, they create what we know as changng weather.

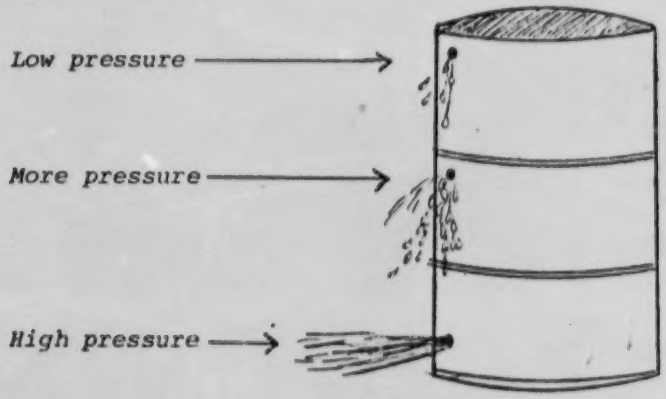
Air masses are moved by the wind. And what moves

the wind? Two things: First, there's the heating of air by the sun. Hot air moves toward cold, and cold air is drawn to heat. This means that the air at the equator is heated and begins heading north; when it gets into the Arctic Circle it is cooled off and turns around for a trip back to the equator. If that was all there was to it, all wind would move directly from north to south and back again. But the second factor, the earth's rotation on its axis, modifies the wind. It creates a veering off of the north-to-south course. In the Northern Hemisphere this has the effect of nearly all wind moving from the west to the east. In most of the United States and Canada, any change from the prevailing west winds (a west wind being a wind that blows from the west) is likely to bring foul weather. Thus, the American folk poem:

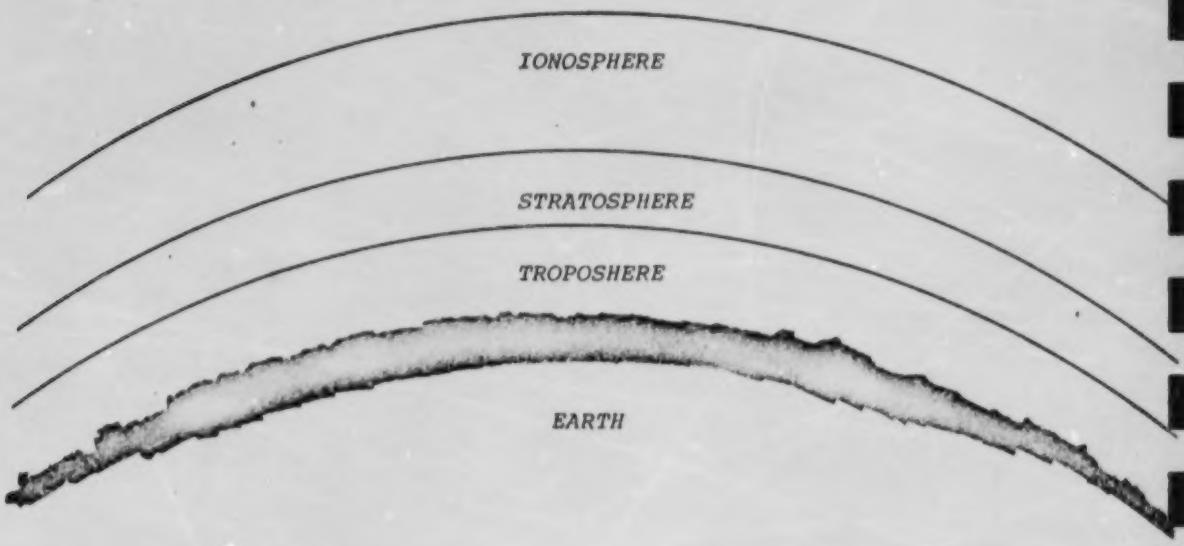
'When the wind is in the north,
The skillful fisher goes not forth;
When the wind is in the east,
'Tis good for neither man nor beast;
When the wind is in the south,
It blows the flies in the fish's mouth,
But when the wind is in the west,
There it is the very best.'

In the United States the wind seldom blows directly out of the west. In the summer the wind is southwesterly and in the winter, northwesterly. But any westerly wind is considered to most probably be associated with pleasant weather.

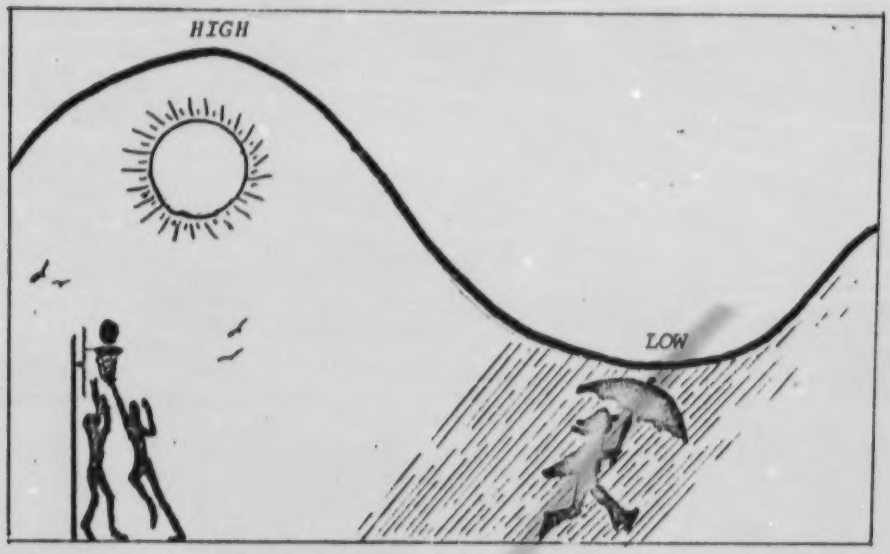
Air pressure is what we call the weight of the air above pushing down on the air below. Since air has weight, then it is obvious that the air nearest the earth is under more pressure than air ten miles up. It is just like a barrel of water:



The atmosphere is much like the barrel. There are layers of air above the earth that become thinner (in terms of weight and oxygen) the higher you go. The basic layers are the *troposphere*, the *stratosphere*, and the *ionosphere*:



The higher the pressure areas the less likely it is that poor weather will be below. A low pressure area is one which is close to earth and is being pushed down by dense air:



The instrument that gives us this information is the *barometer*. The barometer is an air-weighing machine. It notes change in the atmospheric pressure and thus is an aid in forecasting weather. Ask your instructor to further explain the barometer and set up an observation schedule for its usage.

DO AT LEAST ONE EXPERIMENT FROM THE TOPIC 'B' ACTIVITY LIST.

QUESTIONS:

1. *Draw a diagram showing the various layers of atmosphere and label them.*

2. *What does a barometer measure?*

   _____

3. *What happens to air when it warms?*

   _____

   _____

   _____

   _____

SUPPLEMENTAL:

The following are kits available at the Kodiak IMC. They are very helpful for graphic explanations:

KFS-25	Weather (4 filmstrips)
KFS-65	Basic Weather (4 filmstrips)
T-213-218	Elementary Science: Weather (6 transparencies)

C. FRONTS AND MASSES

Objectives: 1. Student must explain a warm and cold front.

2. Student must explain the interaction of air masses.

Unit 3 Weather

Topic C: Fronts and Masses

'Rain long foretold, long last;
Short notice, soom will pass.'

Air masses, those blobs of air, are formed in one of several source regions, then move out with the wind. But while the air mass sat in the source region (say over the Bering Sea), it picked up the characteristic of the region, just as non-smoker's clothes will pick up the odor of cigarettes after spending some time in a room where people are smoking. So an air mass that started up above polar waters will be cold and wet, while one that started over continental land in the polar region would be cold and dry. Those that start in the tropics are obviously warm.

Meteorologists give these air masses fancy names that refer to their origin, such as Tropical Maritime (mT) and Polar Continental (cP), but such names are not important. What is important is to understand that air masses differ in temprature and moisture content and that you can tell what an air mass contains by looking at where they came from.

You can get even more basic and say that there are only two kinds of air masses. Warm and cold. These two do not mix, and when they meet, there's a fight for control that can be seen and felt by thunderstorms, snow, hail, rain, and high winds sometimes resulting in tornadoes and hurricanes. Naturally, since an air mass is moving in a direction it has a front. It is along these fronts, sometimes thousand of miles wide, that the collision between warm and cold air masses takes place.

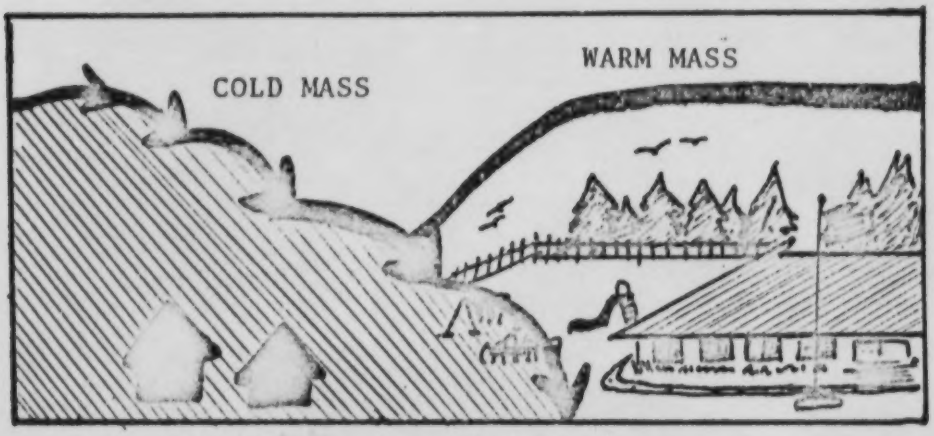
The previous numbered page in the original document was blank.

Being able to decide which one of these masses will reach your location first is the trick to observation forecasting. Since fronts don't always strike with the same force, it becomes quite a trick.

The cold front storm is the one to fear. The most violent storms come with cold fronts: They give the shortest time warning of an approach and are past most quickly. The warm front weather is just the opposite. Precipitation with a warm front is generally mild. The warm front gives lots of warning as it moves in, yet usually stays longer, bringing the mild, long-duration rains. Thus, the weather wisdom:

'Small showers last long,
But sudden storm are short.'

-Shakespeare, Richard III



In order to identify fronts, you must be able to identify clouds. There are some basic categories of clouds that we will go over. *CIRRUS* clouds are high, wispy formations. They are usually over 30,000 feet high and are really frozen strips. Cirrus clouds usually indicate the beginning of a warm front. They are often called *'Mare's tails'* because they look somewhat like a tail.

CIRRUS CLOUDS
(high and wispy)

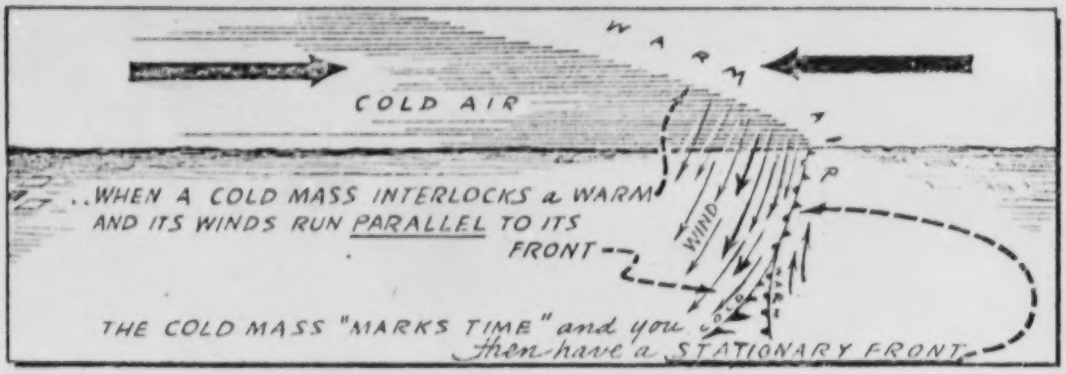
CUMULUS CLOUDS

The characteristics of a cold front are its cumulus or lumpy clouds, the cold dry air it brings, it sudden rain, and its speed, which often averages twenty or thirty miles an hour. The cumulus cloud is usually low in altitude and has a puffy-lumpy appearance. As the culumus is bumped around and meets a strong cold front, it may turn into the high-rising, mushroom-like, cumulonimbus.

CUMULONIMBUS CLOUDS

With the speed and also the backward slant of a cold front, there is not much warning before its entrance, except for its frequent thunder and lightning. Whereas the warm front unually forecasts a lingering rain, the cold front hits with a quick, hard shower. The cold front is steeper and faster than the warm front, which it frequently overtakes. When thi occurs, you will have an *occlusion*, where the stronger front lifts the weaker front aloft.

Whan a warm and cold front collide head-on, the result is often a deadlock and *stationary front*. This front features dull skies and a lingering rain until one air mass or the other becomes strong enough to break a bulge through the frontal line and cause it to decay. An interesting feature to note about the stationary front is that its winds flow parallel but each in an opposite direction.



DO THE VOCABULARY EXERCISE FOR TOPIC C FROM THE ACTIVITIES SECTION AT THE BACK OF THIS UNIT.

DO ONE OTHER EXERCISE FOR TOPIC C FROM THE ACTIVITIES SECTION.

QUESTIONS:

1. What type of weather would a continental polar air mass bring? _____

2. What are the characteristics of a cold front? _____

_____

3. Which front is more likely to bring drastic storm weather?

_____

_____

4. Explain the difference between cirrus and cummulus clouds.

_____

_____

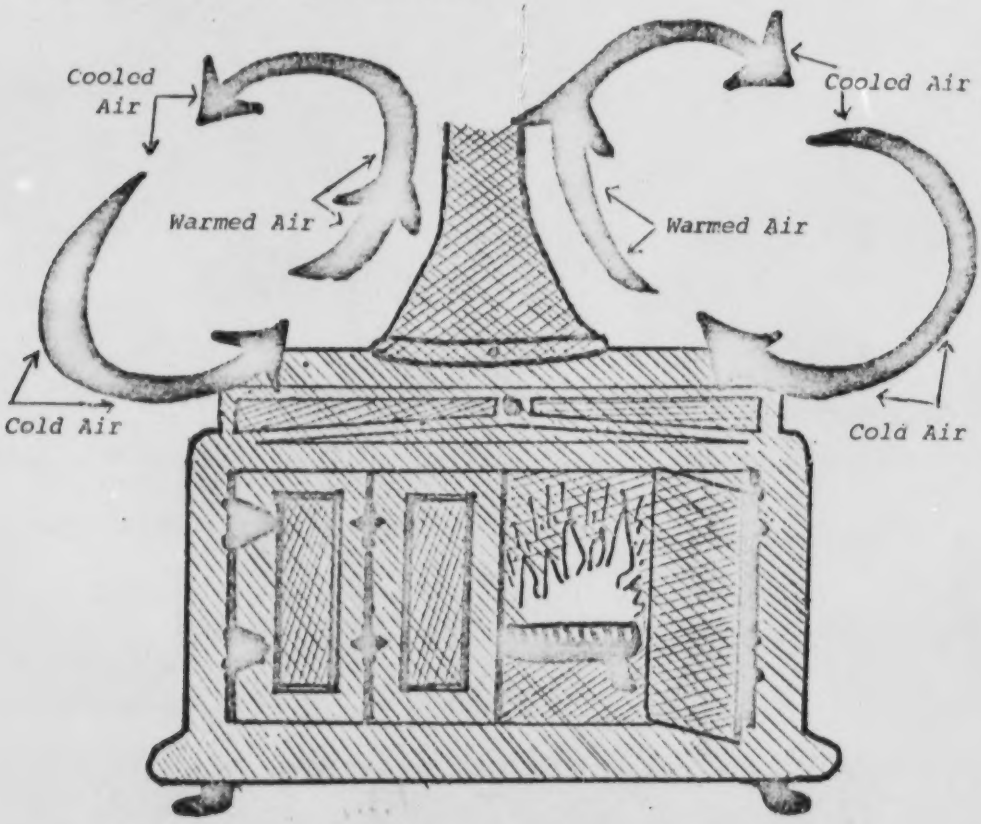
SUPPLEMENTAL:

Unit 3 Weather

Topic D: Wind

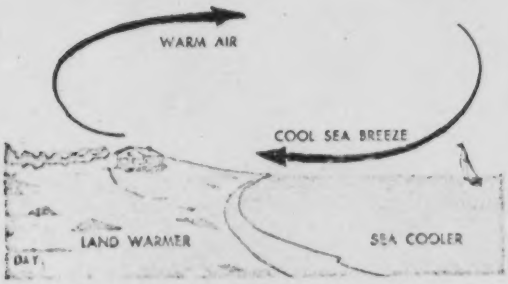
Wind is no more than air in motion. As such it is energy. The wind performs amazing tasks essential to our atmosphere. It fills the sky with clouds, then sweeps it clear again. It drives the cooling, moisture-laden fogs in off the sea. It blows entire storm systems halfway around the world, moving heat and moisture from one region of the earth to another. It air-conditions and ventilates cities that lie along the coast. It helps to push the ocean currents on their global journeys. It sculptures sand and snow, scatters seeds and spores.

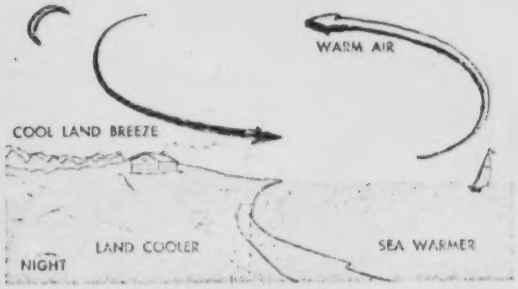
What makes the wind blow? Simply, the difference in atmospheric pressure. Because there are always differences in temperature of the atmosphere, there are also pressure differences, and these differences attempt to seek there own balance. The best example for understanding this is that of the common heating stove. As the air near the stove warms, it moves upward. As it moves it displaces the cold air. The colder air moves in to take the place of warmed air and circulation takes place. This circulation is the same as a sea-breeze or mountain breeze.



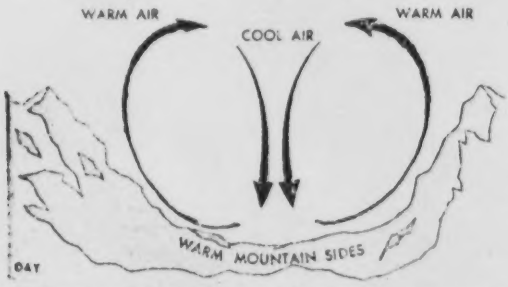
The previous numbered page in the original document was blank

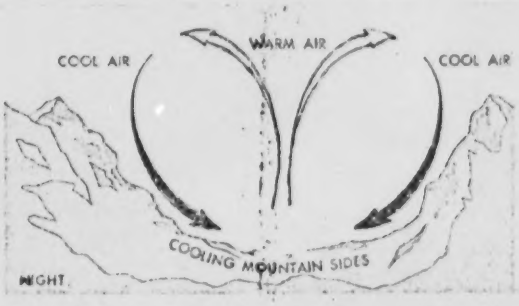
Simple examples of the effect of temperature change are land and sea breezes. The sun heats land and water differently. Over oceans and lakes most of the heat energy is consumed. The air is not heated very much. Land, however, absorbs only about 2/3 as much heat as water. So air over land tends to receive more heat than does air over water.





HOW LAND & SEA BREEZES ARE CAUSED
Unequal heating & cooling of land & sea cause breezes. By day the land is warm & the sea cool. The warm air rises & the cool air descends. The breeze is off the sea. At night the land is cool & the sea warm. The breeze is off the land.



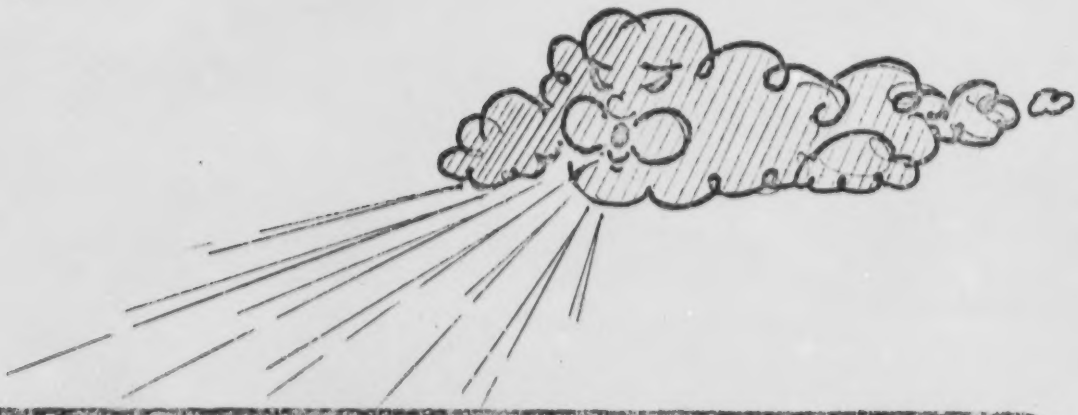


HOW MOUNTAIN & VALLEY BREEZES OCCUR
Day & night changes in heating mountains cause breezes. By day the heated air rises along the warm slopes, but descents into the valley. At night the circulation is reversed as the mountains cool. Airplanes try to avoid these updrafts & downdrafts.

One of the most important things to watch about the wind is its speed. Being weather-wise means being able to judge the upcoming weather with some degree of accuracy. Since it is the wind that moves

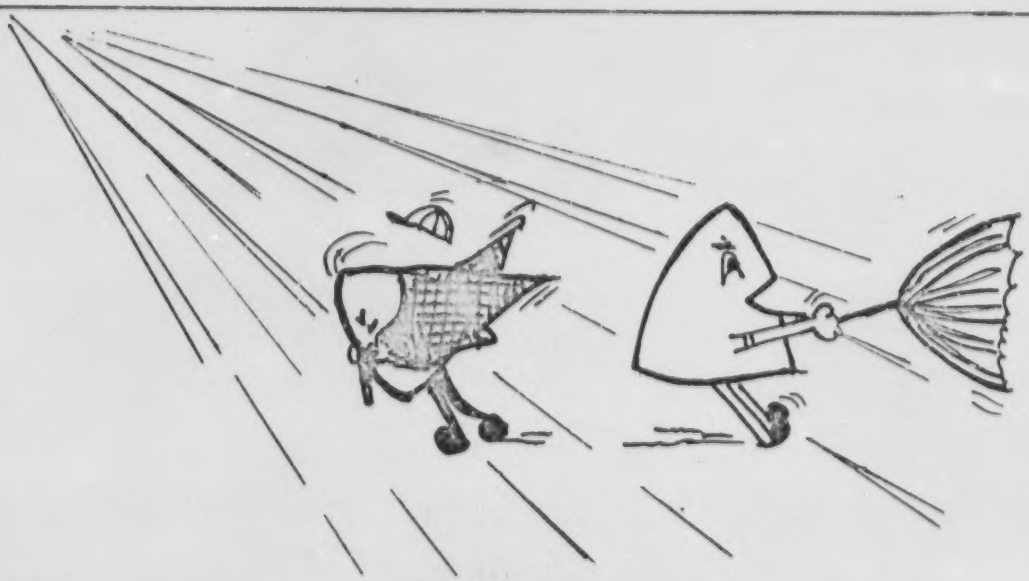
BEST COPY AVAILABLE

D. WIND



OBJECTIVES: 1. The student must explain the basic principle of wind.

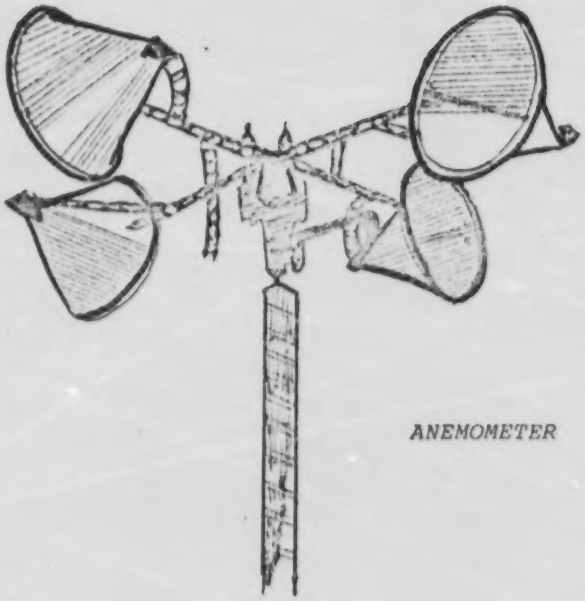
2. The student must know the basic functions of wind.



weather, knowing its speed or ways to determine it are essential. Many years ago an admiral in the Navy decided it was important to have some kind of scale for determining how fast the wind was blowing. His name was Admiral Beaufort, and the Beaufort Scale is still used today.

Wind Speed in MPH	Beaufort Number and Wind Effects on Land	Official Designation
Less than 1	0 Calm: Smoke Rises Vertically	LIGHT
1-3	1 Direction of wind shown by smoke but not by wind vanes	
4-7	2 Wind felt on face: Leaves rustle: Wind vanes move	
8-12	3 Leaves and small twigs in motion: Wind extends light flag	GENTLE
13-18	4 Wind raises dust and loose paper: Small branches move	MODERATE
19-24	5 Small trees in leaf begin to sway: Crested wavelets appear on inland waters	FRESH
25-31	6 Large branches move: Telegraph wires whistle: Umbrellas become unweildy	STRONG
32-38	7 Whole trees sway: Walking into wind is difficult	
39-46	8 Twigs break off trees: cars veer on road	GALE
47-54	9 Slight structural damage occurs (Chimney pots, roof slates blown away)	
55-63	10 Trees are uprooted: Considerable structural damage is done	WHOLE GALE
64-72	11 Widespread damage	
73 or more	12 Widespread damage	HURRICANE

For precise readings of wind speed we use an instrument called an *anemometer*. Along with a *wind vane*, which shows directions, a person can make a good prediction concerning approaching weather.



ANEMOMETER

WIND VANE

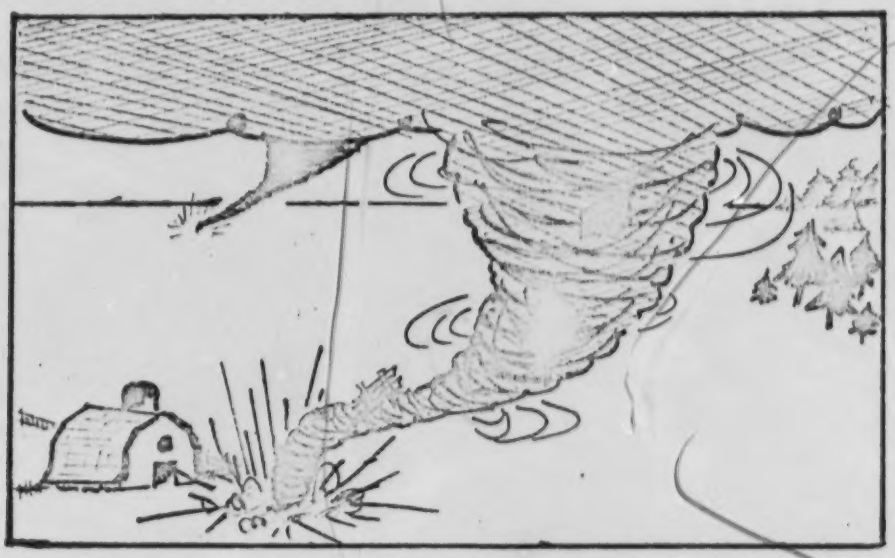
We have learned that all the winds near the earth's surface are caused by differences in atmospheric pressure brought about by uneven heating. Air is pushed from regions where pressure is high to regions where pressure is low. Weather maps make this plain with the labels, '*high*' and '*low*'. High-pressure air in a child's balloon, when released, rushes outward to join low-pressure air. Air under 30 pounds of pressure in a tire may, if the tire has a weak spot, burst through to meet the average 15 pound pressure of the surrounding atmosphere. Likewise, wind movement is caused by the forces acting to push from higher to lower pressure.

Sometimes nature reacts like a busted balloon and unleashes some extremely powerful winds. At times these winds carry snow or rain or sand or sleet and cause terrible destruction. They are called *hurricanes, tornadoes, typhoons, blizzards,* and *cyclones*. Regardless of the name, they are natures' most destructive force and have killed more than 12,000 people in the United Stated alone.

A *blizzard* is cold wind and snow moving at high speeds.

A *hurricane* is a storm that often has winds over 175 miles per hour and a diameter of 400 miles.

Tornados are whirling winds that may reach 600 miles per hour at their eye. They are accompanied by a funnel shaped cloud and average only two hundred yards for a diameter.



DO EXERCISE 1, TOPIC D IN THE ACTIVITY SECTION FOR THE UNIT.

DO ONE OTHER EXERCISE OF YOUR CHOICE FROM THE SAME SECTION.

QUESTIONS:

1. *Explain in your own words what causes wind.*

   _____

2. *How fast must the wind blow before slight structual damage occurs?*

   _____

S3D

3. *What is an anemometer and what is its purpose?*

_____

_____

4. *Which absorbs heat faster: Land or Water?*

_____

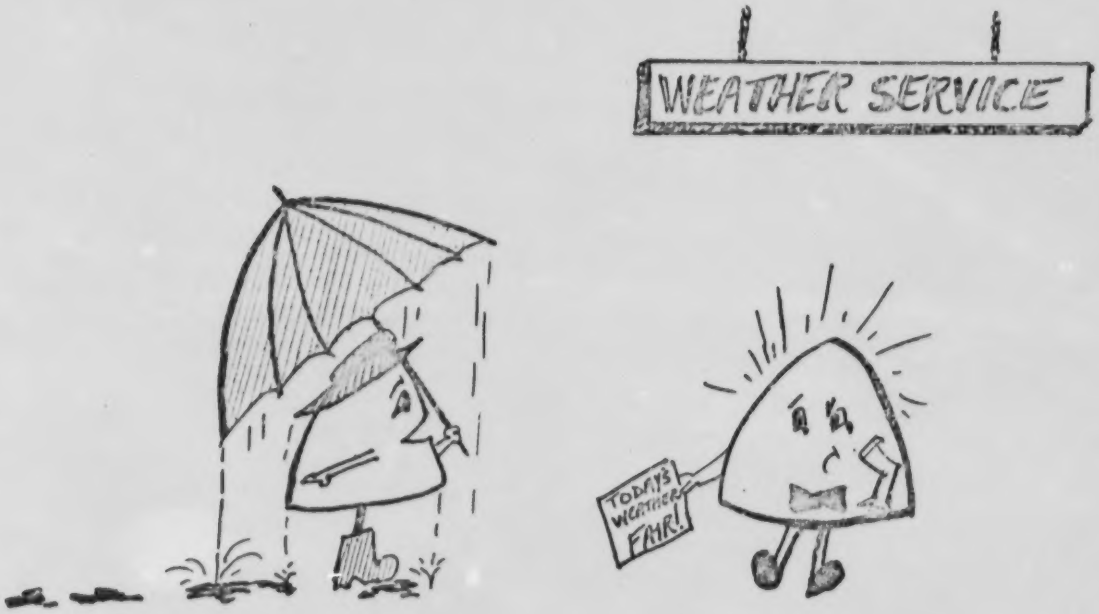
SUPPLEMENTAL:

Most classroom encyclopedias have good concise articles on wind.

All of the books listed at the end of Topic A have chapters on the wind.

155

E. WEATHER FORECASTING



OBJECTIVES: 1. The student must be able to explain the nature and purpose of five basic weather instruments.

2. The student must give the major indicators in weather observation forecasting.

Unit 3: Weather

Topic E: Weather Forecasting

'The minds of men do in the weather share,
Dark or serene as the day's foul or fair.'

As a process, weather forecasting, whether professional or amateur, is much like medical prediction. The weatherman, like the doctor, looks for symptoms in the present weather and makes a guess. Like a doctor, the weatherman begins by taking the temperature. Then he obtains the *relative humidity* - the amount of water vapor in the air divided by the amount it could hold at a given temperature and pressure. Temperature, in combination with relative humidity, may be the key symptom to coming rain: *Warm air holds more moisture than cold air*. If instruments show a sharp rise in moisture while temperature remains the same, then rain is likely.

We have learned the basics of weather in the last four topics. Knowing those essentials is all one needs to begin making forecasts. Certainly having only local information is limiting, but marine forecasts are usually available on the radio, and newspapers often have weather maps which show fronts moving in. Using this information with what is available locally can often give amazingly accurate readings.

There are two kinds of fronts and two distinct sets of cloud formations that go with them. The meteorologist or amateur has only to read these conditions in advance. The meteorologist and the amateur forecaster have the same changes as indicators:

air pressure *temperature*

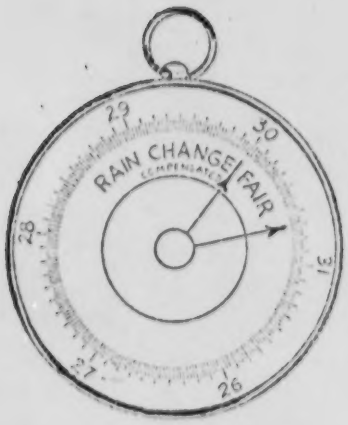
humidity *wind speed*

wind direction

The meteorologist reads these changes directly from his bank of instruments. The observation forecaster, like yourself, may use a couple of instruments, too, but, most of the time will use his own senses and observations from his surroundings. To become a weather-wise person,

it is best to start out with the basic meteorologist's tools as a backup. When a natural indicator is observed, it can be evaluated with the instruments. Soon the sensitive observer will be able to read the air pressure, humidity, temperature, wind speed, and wind direction without mechanical aids.

'When the glass falls low,
Prepare for a blow;
When it rises high,
Let all your kites fly.
The hollow winds begin to blow,
The clouds look black, the glass is low.'



ANEROID BAROMETER

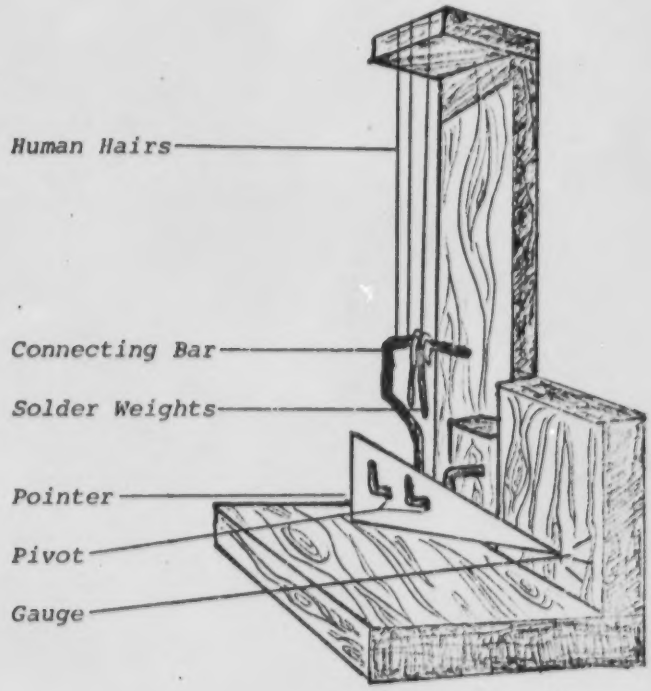
The Barometer (for measuring air pressure) is *'The Glass'* in the poem.

The devices needed to determine increases in humidity are called *hygrometers* (water meters). *Humidity* is simply the moisture in the air. The air can hold only so much water. When the humidity reaches 100%, then it must rain because the air is completely saturated. It will usually rain long before that. The most basic hygrometer is based on the weather folk knowledge that fibers absorb moisture readily and shorten with increased humidity. The hair hygrometer uses blond hairs treated to remove natural oils. The hairs are connected to a meter, and when they shrink or stretch with changing

BEST COPY AVAILABLE

humidity, the degree of moisture is indicated.

'Curls that kink
and cords that bend:
Signs of rain
and heavy winds.'

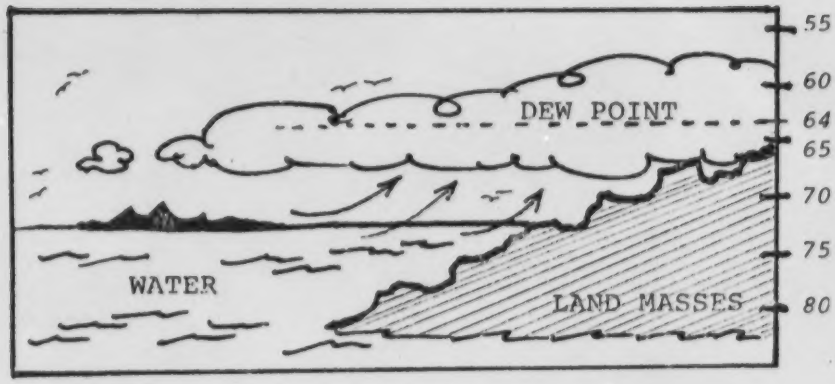


HYGROMETER

Relative humidity is concerned with another concept that has even more meaning: *dew point*. The dew point is the temperature at which the air will no longer hold water, and some form of precipitation can be expected. It is another way of saying the temperature at which you can reach 100% humidity. If the dew point today is 38 degrees and the temperature is 41 degrees and falling, you can expect some kind of moisture. Of course, the greater the spread of temperature between dew point and current temperature, the less chance of rain.

Dew point and dew should not be confused. Dew point is an indicator of how far the atmosphere is from overflowing. Dew is the visible droplets of moisture that form on grass, plants, and metal objects in the morning.

Dew is formed when air is chilled after sundown as



Moist air rises to dew point and clouds form.

the earth gives up its heat. *To form dew,* two conditions are needed: *lack of clouds,* and a *windless night.* A cloud cover would hold down heat and not allow the drop in temperature of the grass needed for condensation. A night breeze would carry warm air over the ground, again preventing dew from forming. Morning dew thus comes with conditions that are right for a fair weather day. Thus, the saying that so often proves correct:

'When the dew is on the grass,
Rain will never come to pass.'

And the opposite,

'When the grass is dry at morning light,
Look for rain before the night.'

In summer, fogs are formed in the same way as dew, on windless, cloudless nights, and thus are as much an indicator of good weather as dew. But in winter, fogs are often the result of warmer and wet air being blown over relatively cold land surfaces. These fogs are more likely to be indicators of rain than fair skies. This rhyme will help you remember the difference:

'A summer fog for fair,
A winter fog for rain;
A fact most everywhere,
In valley and on plain.'

This STARS unit has attempted to give you the basics for starting to become weather-wise. Weather is the most talked about subject in the world. There is hardly a day that goes by that some mention of weather will not be made around you. Since you will be with weather for the rest of your life, it is a very good idea to know something about it. The next time you're being rained on, think about how it got there and try to figure out when it will be gone. It's fun!

After you have completed the assignment and questions following this topic, you will be ready for the Unit Test. If you still have problems with some area covered, or want to do more work in weather, see your instructor. Your instructor can help you get more sources, set up experiments, or explain certain areas of concern.

DO EXERCISE #1 FOR TOPIC 'E' IN THE ACTIVITIES SECTION AT THE END OF THIS UNIT.

DO ONE OTHER EXERCISE FOR TOPIC 'E' FROM THE REMAINING SUGGESTIONS IN THE ACTIVITIES SECTION.

QUESTIONS:

1. *Explain what each of the following instruments measure:*

   *a)Thermometer*_____

   *b)Barometer*_____

   *c)Hygrometer*_____

   *d)Anemometer*_____

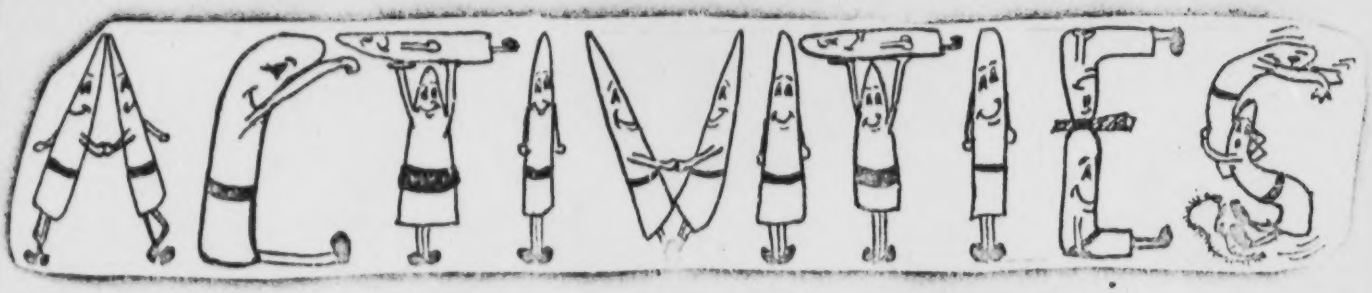
2. *If it is foggy on a summer morning, what sort of weather will you likely have for the day?*

   _____

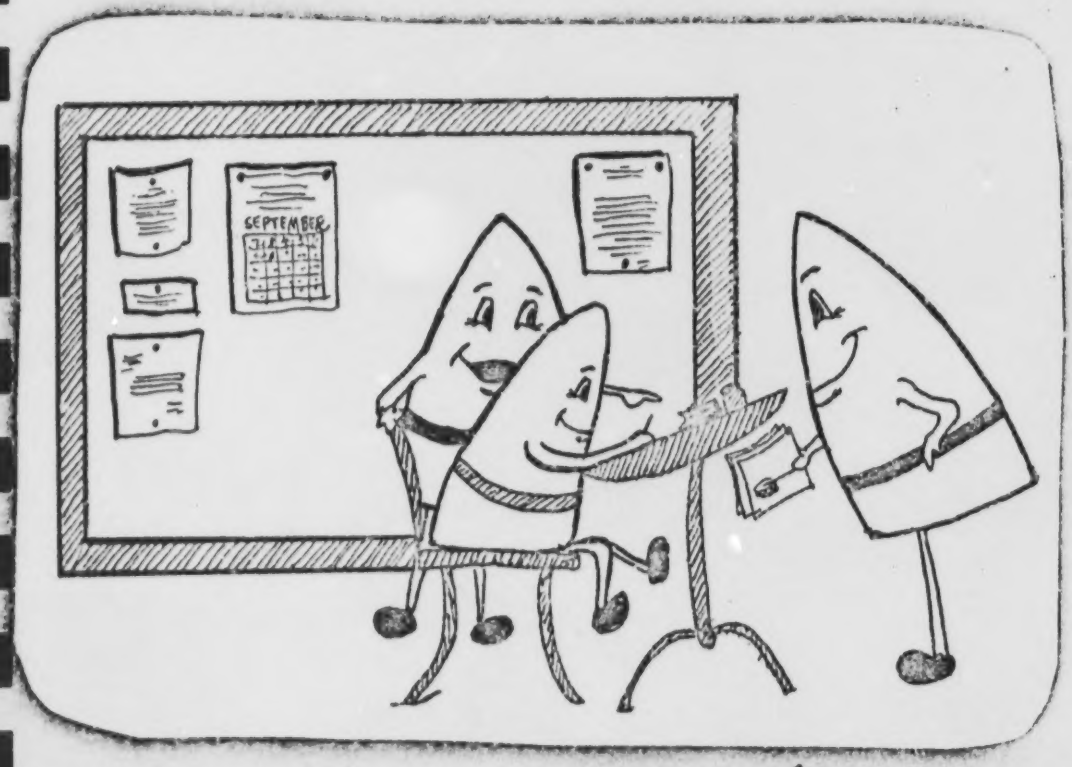
3. *What conditions must be present for dew to form?*

   _____

If you have completed all the required exercises from the Activities Section, and answered all of the Topic Questions, you are ready to take the Unit 8 Test.



SECTION



F.

A. WEATHER LORE

1. WORDS

Match the word with the definition.

Try to use the word in your daily speech.

1.	meteorologist	a.	Day-by-day changes in temperature, precipitation, and wind.
2.	data	b.	General weather patterns over long periods of time.
3.	lore	c.	Scientist who studies and predicts weather.
4.	weather-wise	d.	Facts, information.
5.	climate	e.	Folk knowledge.
6.	weather	f.	Knowledgeable of weather signs.

EXPLAIN A WEATHER PROVERB

2. Choose one of these weather sayings, or one from the text, and write a paragraph explaining what it means.

Rainbow to windward,
foul fairs the day,
Rainbow to leeward,
damp runs away.

The moon with a circle
brings water in her beak.

When the wheel is far,
the storm is n'ar
When the wheel is n'ar,
the storm is far.

Clouds look as if scratched by a hen,
Be ready to reef your top sails in.

When clouds appear like
rocks and towers,
The earth's refreshed with
frequent showers.

Year of snow,
Crops will grow.

MAKE A POSTER

TO ILLUSTRATE TWO OR MORE OF THESE SAYINGS OR OBSERVATIONS REGARDING ANIMALS AND WEATHER.

3.

Ants that move their eggs and climb,
Rain is coming anytime.

When the glowworm lights her lamp,
The air is always damp.

When locusts are heard, dry weather will follow.

A fly on your nose you slap and it goes,
If it comes back again, it will bring a good rain.

If many gnats are seen flying in compact bodies
in the beams of the setting sun,
There will be fine weather.

Spiders strengthening their webs indicate rain.

When trout refuse bait or fly,
There ever is a storm a-nigh.

Before the storm the crab his briny home
Sidelong forsakes, and strives on land to roam.

When porpoises and whales spout about ships at sea,
storms are coming.

If fowls roll in the sand,
Rain is at hand.

When loons fly out to sea,
It will fine weather be.
When loons fly toward land,
Bad weather's at hand.

Seagull, seagull, sit on the sand,
It's never good weather while you're on the land.

Swallows fly high: clear blue sky;
Swallows fly low: rain we shall know.

4. GATHER LOCAL WEATHER LORE

Talk to older people in the village. Find out what weather sayings they know. You will need to prepare your interview questions in advance.

You might ask:

"How do you know when bad weather is on its way?"

"How do you know when the weather is going to be good?"

"Do any animals you know act differently when the weather is going to change?"

Do plants ever act differently to indicate weather changes?"

Write down what you find out.

5. MAKE UP SOME "WISE OLD SAYINGS" THAT ARE NEW.

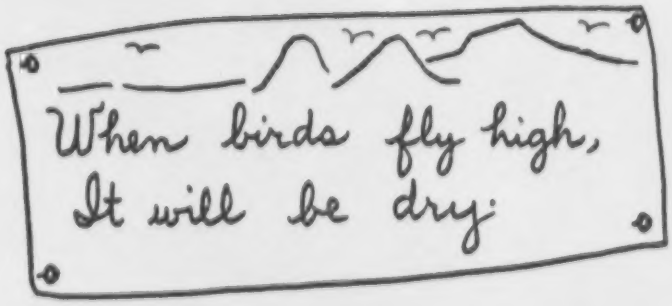
Make up an original weather saying.

Make it in the form of a rhyme, if you can.

Make a poster of it.

Put the poster in a public place.

See if you can get other people to adopt the saying as weather lore.



6. RESEARCH THE WEATHER LORE OF OTHER LANDS

THE RUSSIAN FARMERS SAY,

"Corn is as comfortable under snow as
an old man is under his fur cloak."

THE ANCIENT CHINESE SAID,

"Rainbow in the eastern sky,
The morrow will be dry,
Rainbow in the west that gleams,
Rain falls in streams."

THE CHINESE ALSO SAY,

"If wind rises at night,
It will fall at daylight."

Research the sayings of other people and other places in regard to weather. Write a paper on what you find.

B. ATMOSPHERE

1. WORDS

BAROMETER	AIR PRESSURE
ATMOSPHERE	GRAVITY
WIND	AIR MASS
ROTATION	

Use these words to answer the questions. Look them up in the dictionary, if necessary.

1. What is the daily turning of the earth called?

2. What common word is the term for air in motion?

3. What do we call the force that pulls things earthward?

4. What is the machine called that weighs air?

5. What is the term for a large body of air moving together?

6. What do we call the layer of air surrounding the earth?

7. What is the term for the weight of upper air pushing down on the air below?

171

2. HOW YOU CAN MAKE A TUNA CAN BAROMETER

You can make a barometer. It will be simpler than the one the weather people use, but will still tell you how the air pressure is changing.

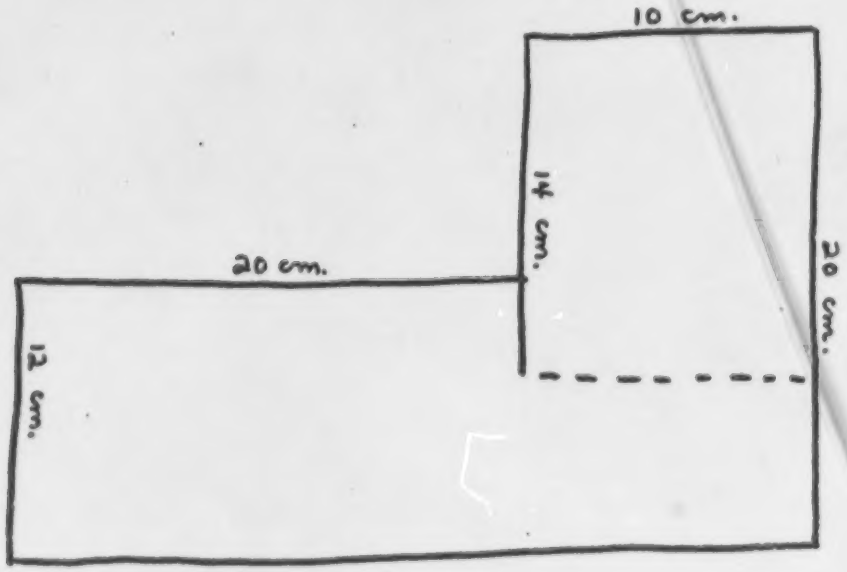
Take:
- an empty tuna fish can
- a strong rubber band
- a large balloon
- scissors
- a plastic soda straw
- cardboard
- masking tape
- a metric ruler

1. Cut a piece of rubber from the balloon and stretch it over the open top of the tuna can. Use the rubber band to make the top airtight.

2. Cut one end off the straw to make a pointer.

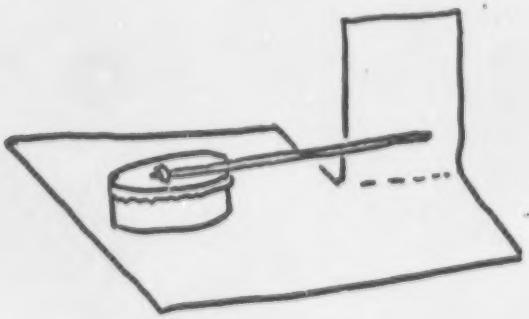
3. Tape the uncut end of the straw to the center of the rubber top.

4. Cut a piece of cardboard by this patten:



5. Fold up the 10 cm. X 14 cm. at the place where the dotted line is.

6. Place the can on the cardboard with the pointed end of the straw alongside the vertical cardboard section.



7. Make a mark at the place where the straw points now. That will be a reference point to allow you to see change.

QUESTIONS:

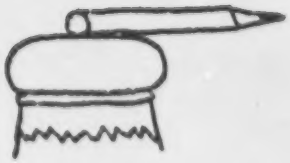
1. What will happen to the rubber top and to the pointer when air pressure decreases in the can? (Press on the top of the can slightly to demonstrate your theory.)

2. What will happen to the rubber top and to the pointer when air pressure increases?

3. Observe the barometer over a period of days to check changes in air pressure.

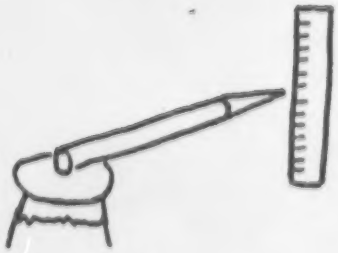
HOW TO MAKE A GLASS BAROMETER 3.

1. If a tuna can is not available to you, or if you'd rather, use a glass jar or bottle instead. Fasten the rubber balloon covering tightly over the mouth of the bottle or jar with a rubber band.



2. Tape a short pencil to the center of the rubber cover.

3. Put the pencil lightly against a piece of paper on the wall to which you have attached a scale.



4. You might want to move the pencil daily at a set time of day.

4. WHAT SORT OF BAROMETER DO SCIENTISTS USE?

Do research on the type of barometer used by scientists to measure air pressure.

Make a drawing to illustrate how it works.

5. AIRPLANE ALTIMETERS

Talk to a pilot to discover how the altimeter on her or his plane works. Read what you can find on the subject.

Write a paper, describing the working of an altimeter.

6. THE CORIOLIS EFFECT AND THE CURRENTS

Partly due to the rotation of the earth, the water and air moving in the ocean areas moves in circles, or in giant eddies. (It is also the earth's rotation that causes the water to move clockwise in the tiolet bowl when you flush it.....And if you're south of the equator, it flushes counter clockwise. Add that to your store of useful knowledge!)

Using an atlas and a map of the world, draw the path of the major wind currents over each of the world's oceans.

EXPLAIN DESERTS

7.

You might observe that most of the world's great deserts occur at approximately the same latitudes (distances from the equator).

Why is that true? See if you can explain it from your knowledge of wind currents and weather. If not, read about deserts such as the Sahara, Kalahari, the Gobi, and the Australian Desert and see if you can find an explanation.

You might make a map of the world's deserts as part of your project.

C. FRONTS AND MASSES

1. WORDS

front	marine
continental	cirrus
cumulus	occlusion
stationery front	stratus

Write the word that fits the definition.
Use your dictionary, if necessary.

_____1. High, wispy clouds.

_____2. Low, fog-like clouds.

_____3. Puffy, towering clouds that sometimes precede thunderstorms on a clear day.

_____4. An air mass that lingers, often characterized by dull skies and rain.

_____5. In weather, an area where two air masses clash.

_____6. In weather, a situation where the strong front pushes the other upward.

_____7. Having to do with the sea; in climate, wet but with no great extremes of heat or cold.

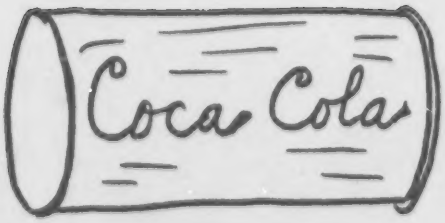
_____ 8. Having to do with large land masses; in climate, having great extremes of winter cold and summer heat.

2. WHAT MAKES POP POP ?

Set a can of soda pop in the sun for a short period of time.

Open it. (For safety, only warm it a little.)

Write a paragraph to explain what makes warm pop POP!

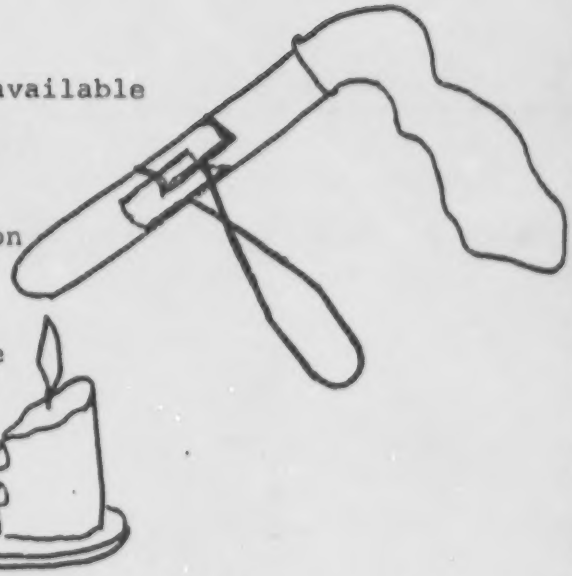


3. HOW DOES AIR ACT WHEN IT'S HEATED?

For this experiment you need:

a candle
a candleholder
small test tube
test tube tongs
a balloon
a baby food jar
matches
safety goggles

(If some of the objects are not available you may be able to substitute.)



1. Stretch the end of the balloon tightly over the opening of the test tube.

2. Light the candle and hold the test-tube over it. (For safety, wear goggles to protect the eyes.)

3. Hold the tube over the fire to heat the end and sides.

QUESTIONS:

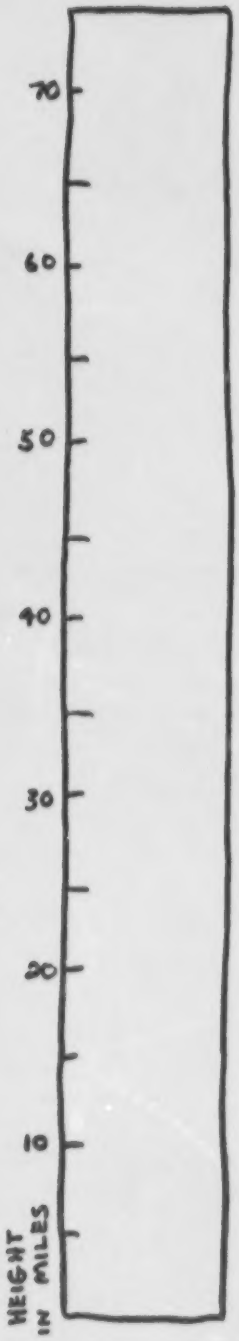
1. What happened to the balloon?

2. How do heated air molecules act to cause the balloon action?

3. Put the test tube in the baby food jar to cool. What happens to the balloon now? Does it still have the same amount of air in it?

4. If the air over a portion of the earth is heated, what will it do? What happens if it is cooled? How does this affect the weather?

4. MAKE A CLOUD SCALE



As you read about the kinds of clouds and how high they are, draw and label them at the proper height on a CLOUD SCALE, like the one of the left.

How high is the world's tallest building as measured on this scale?

How high do Cessna 170's or other small airplanes fly?

How high do 747's fly?

MAKE A CLIMATE MAP OF THE WORLD 5.

Using a blank world map and an atlas make a world climate map. Various atlases use different terms, but these are common climate areas:

Humid Continental
Humid Subtropical
Marine West Coast
Tropical Rainforest
Tropical Savanna
Steppe and Desert
Mediterranean

Color the different areas and provide a key (legend) for the map.

6. MONSOON

Large tropical land masses experience rainy seasons called, in Asia, monsoons.

From what you know of air movements between land and water areas, explain what causes monsoon seasons.

7. EARTH AND WATER

On a sunny day, put a thermometer into a pan of water (be certain it's waterproof!).

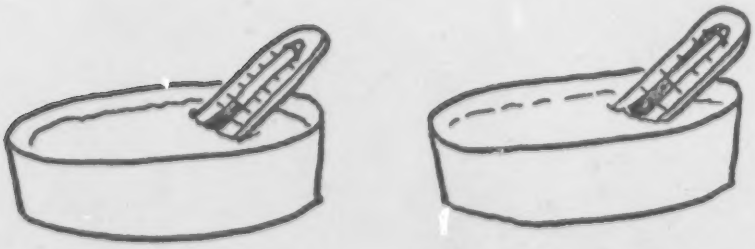
Put another into a pan of soil

Set both into the sun.

See which heats faster.

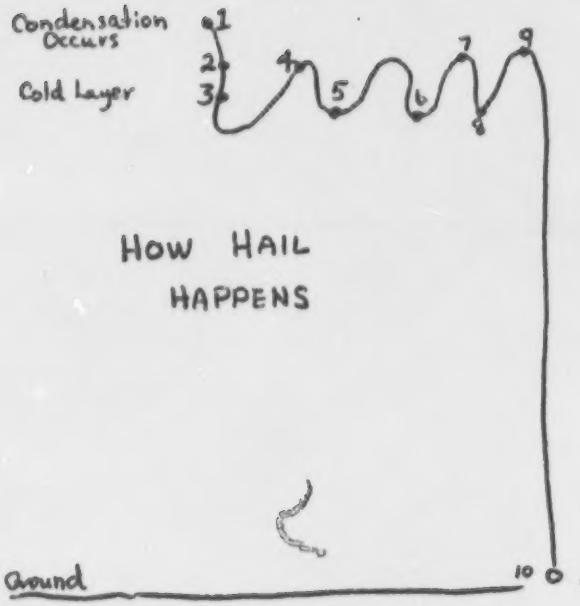
After dark, see which cools faster.

Explain how this affects the weather where you are.



8. KINDS OF PRECIPITATION

All precipitation is caused by the cooling and condensation of water. However, several things can happen to determine in what form the moisture finally reaches the ground. This is a diagram of what happens to a water droplet to form hail:



1. Water condenses on tiny nucleus, possibly a salt or dust particle.

2. Droplets form.

3. They pass through a cold layer of air, becoming ice.

4. An updraft lifts the droplet to a warm layer, where more moisture condenses on it.

5. If falls back through the cold layer, where the droplets freeze.

6,7,8,9. This may happen a number of times, forming large hailstones.

10. Falls to the ground as hail.

Find out what causes sleet, snow, or rain, and draw a diagram to explain what happens.

9. UMBRELLA

Research the history of umbrellas. Write a report.

Make diagrams to explain the mechanism of an umbrella.

HOW DID IT GET ITS NAME?

D. WIND

1. WORDS

anemometer
tornado
blizzard
typhoon
hurricane

Use the words above in the sentences below. Look them up in the dictionary if you need to do so.

1. A _____ swept across Florida, doing millions of dollars worth of damage.

2. The _____ indicated that the winds were blowing 125 miles per hour at times.

3. The Kansas home was wrecked by a _____, its funnel shape dipping down on them in demon-like fury.

4. The boats plying the Indian Ocean took safety in port in an attempt to escape the _____.

5. The Colorado _____ froze a herd of Herefords that were stranded in the draw.

2. REPORT ON HURRICANES AND TORNADOES

Do a report on hurricans or tornadoes.

Explain scientifically what causes them.

(Draw a picture if it is easier than writing a report.)

WHY DOESN"T ALASKA HAVE HURRICANES??????

3. MAKE A HURRICANE MAP

On a map of the world, show the path hurricanes take in the world.

What are hurricanes called in other parts of the world?

WINDS IN GREEK MYTHS

4.

The ancient Greeks personified the winds and made up stories about them. The north wind was Boreas, the south wind was Notos, the east wind was Apeliotes, and Zephyros was the west wind.

Have you heard of any of these characters before?

Read about them and recount one story concerning them.

Zephros was warm and gentle.

Boreas was an old man, full of strength and fury.

Notus carried a watering can, bring rain to Greece.

189

5. GLIDERS AND WIND CURRENTS

You might enjoy finding out how gliders work.

Generally, warm land areas create updrafts which cause the glider to rise. Cool areas make a glider descend earthward.

Make up a story about a glider flying over the area diagrammed below on a warm July afternoon. Justify what you make the glider do, using what you know about wind currents and air pressure.

TRADE WINDS 6.

Winds often make history. In the days when ships were sailing craft, trade was speediest and easiest if ships could take advantage of major wind and ocean currents. That led many of the prevailing winds to be called "trade winds".

From the 16th to the 19th centuries, the "Triangle Trade" occurred along the routes pictured here, an infamous chapter in our nation's past.

Look up the Triangle Trade in your American History references and explain what was traded at each point along the way.

BEST COPY AVAILABLE

7. USEFUL THINGS THE WIND CAN DO

Draw a diagram to show a useful thing the wind can do besides make weather.

Besides sailboats, windmills are one thing you might research. Or wind tunnels, where airplane models are tested.

Wind instruments make beautiful music. You might explain trumpets, flutes, clarinets, ocorinas, harmonicas, French horns, alphorns, or some other of your choice.

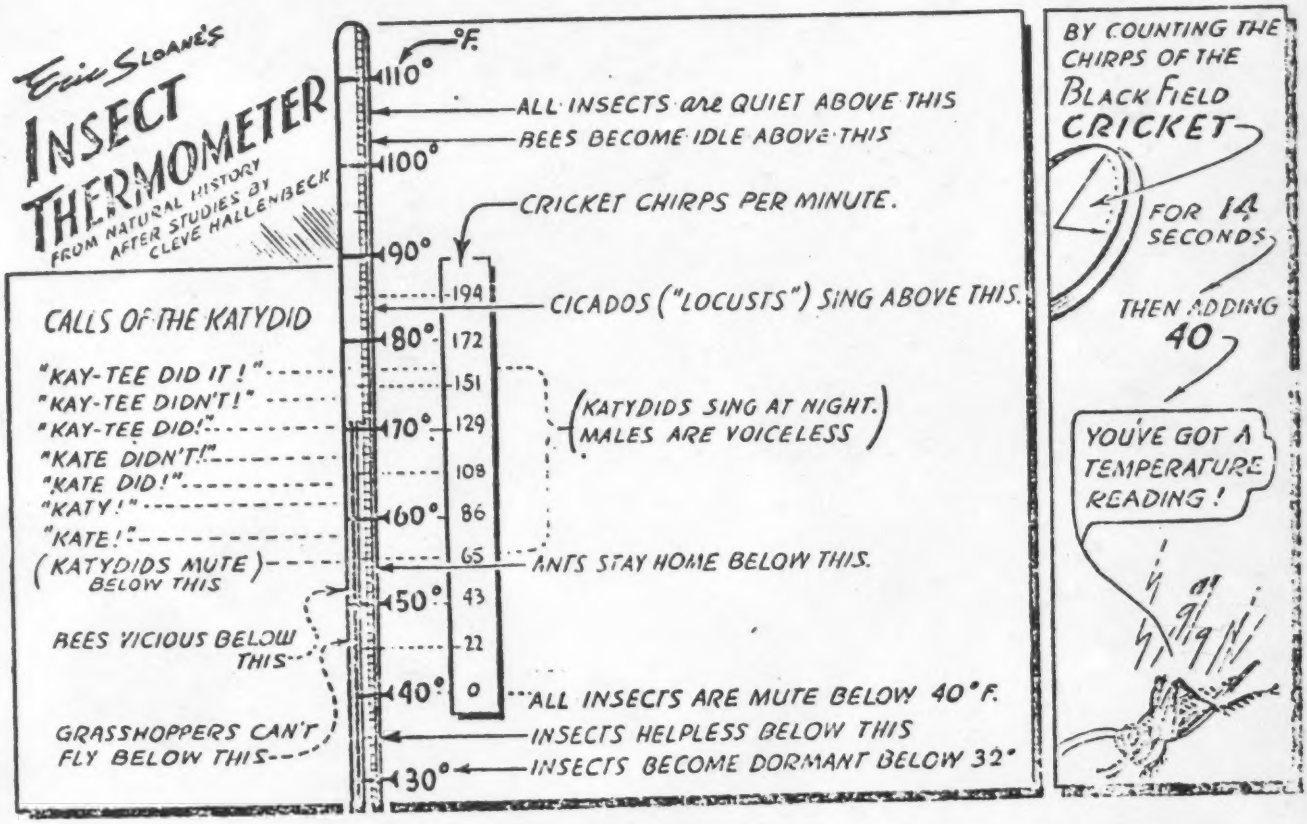
8. MAKE A COLLECTION OF WIND WORDS

For example, what are these things?

A windshield?	A windhover?
A windsock?	A windjammer?
A windfall?	Wind chimes?
A windbag?	Windwards?

Draw a poster, picturing and defining some of your favorite wind words.

9. HOME MADE WEATHER SCALES



Your text gave you Beaufort's Scale of Winds and Waves.

Here is Eric Sloane's Insect Thermometer.

Make up your own scale for predicting or indicating weather, based on natural observation.

MICROFILMED FROM
BEST AVAILABLE COPY

10. WHAT MAKES THE WIND BLOW?

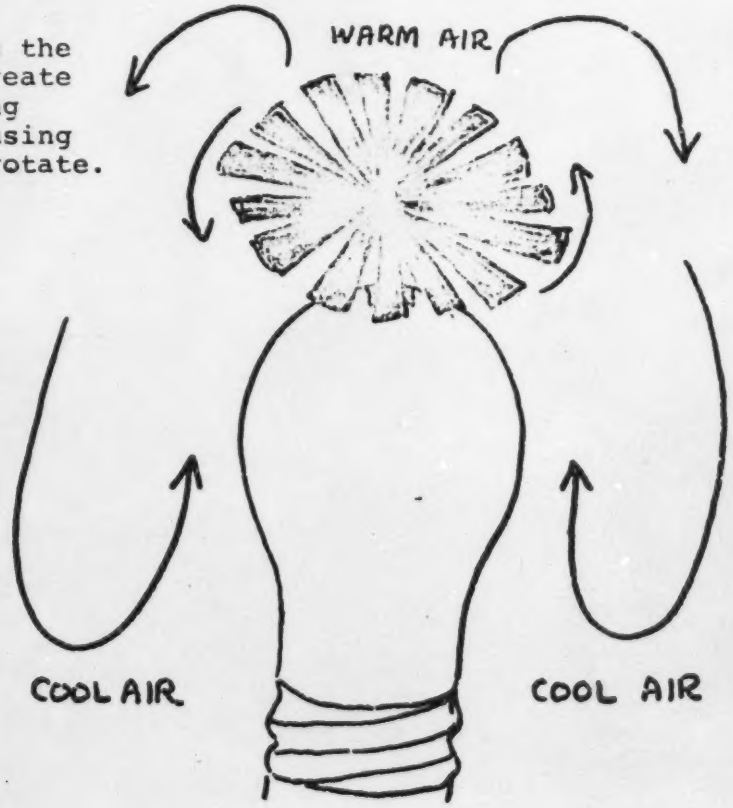
This is an experiment to see how temperature changes make the wind blow.

A. Tape a flat-headed nail to a light bulb.

B. Cut a pin wheel from paper or a tin can and set it on the nail point.

C. Put the light bulb into a lamp and turn on the lamp.

D. As the bulb heats the air, it should create rising and falling air currents, causing the pinwheel to rotate.



MICROFILMED FROM
BEST AVAILABLE COPY

E. WEATHER FORECASTING

1. WORDS

Look up these words in the text or in a dictionary and write a definition for each that you can understand.

dew

dew point

fog

humidity

relative humidity

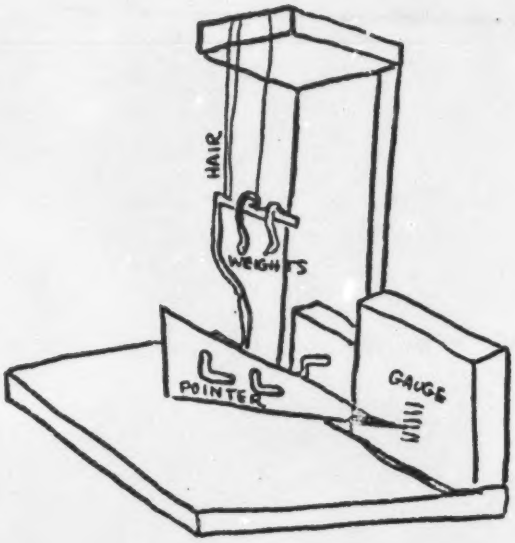
hygrometer

Write a paragraph about weather, using each of the six words correctly.

MICROFILMED FROM
BEST AVAILABLE COPY

BEST COPY AVAILABLE

2. MAKE A HUMAN HAIR HYGROMETER



Read what the text says about hygrometers.

In this model, as the hairs contract (in damp weather), the arm is pulled upward, causing the pointer to point down.

When the air becomes dry, the hair is longer, allowing the point on the pointer to move upward.

MICROFILMED FROM
BEST AVAILABLE COPY

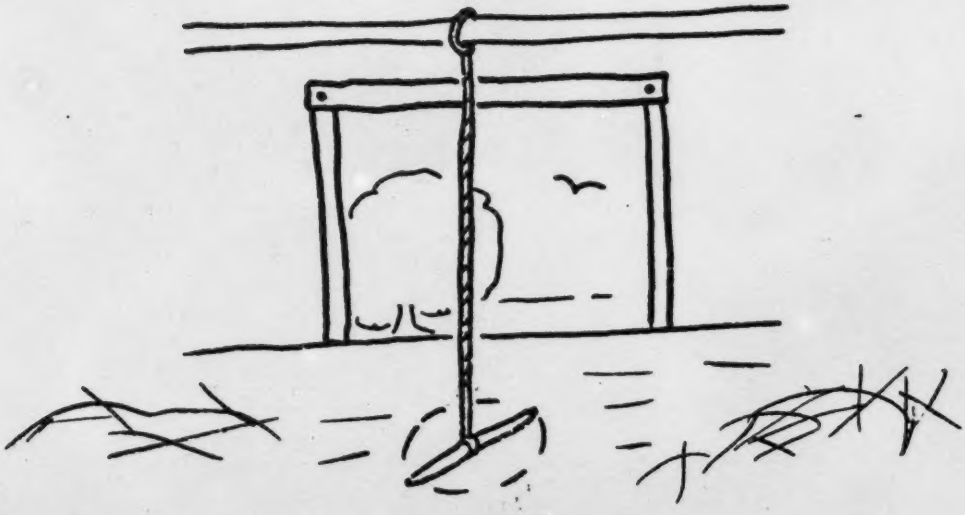
MAKE A BARN-LOFT HYGROMETER 3.

To indicate changes in humidity, one kind of indicator you can make is this hayloft hygrometer.

When the humidity in the air increases, the rope absorbs moisture. It lengthens slightly, moving the stick. When the humidity drops, the rope shortens again, reversing the stick.

FARMERS HAVE A SAYING:

"When the rope twists, forget your haying."

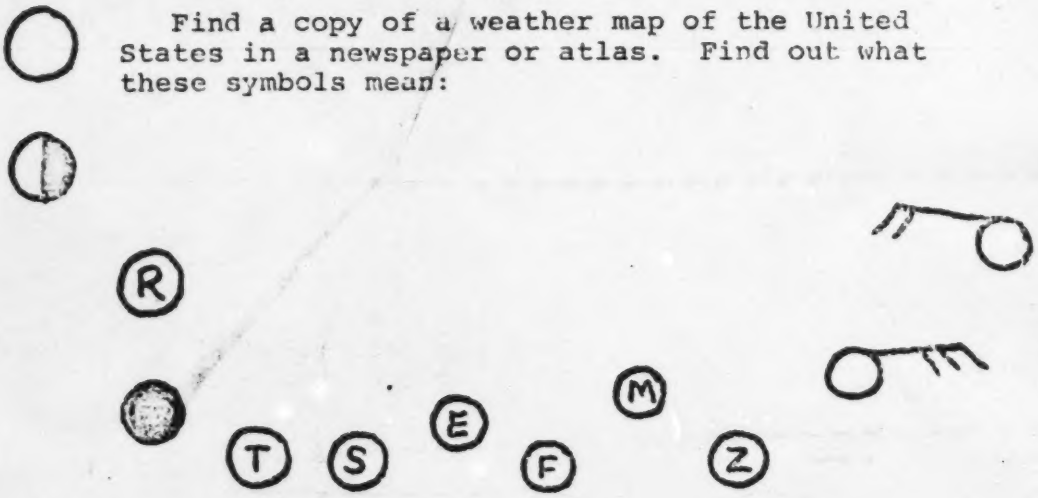


MICROFILMED FROM BEST AVAILABLE COPY

BEST COPY AVAILABLE

4. LEARN TO READ A WEATHER MAP

Find a copy of a weather map of the United States in a newspaper or atlas. Find out what these symbols mean:



What was the weather .....in Miami that day?

in St. Paul?

in New York City?

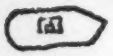
in Fort Worth?

BEST COPY AVAILABLE

5. SPACE TRAVEL AND THE WEATHER

Travel in space has helped us to get far enough from earth to gain perspective and to actually see weather patterns.

Find pictures of the earth taken from outer space. Describe the weather patterns you see.



MICROFILMED FROM
BEST AVAILABLE COPY

BEST COPY AVAILABLE

6. MAKE A WEATHER STATION

Using the instruments you have made, plus others you might devise or have at hand, (such as a weathervane, a thermometer, or a rain gauge), set up a weather station.

Keep a weather record over a period of time. The record could include temperature, precipitation, wind direction and velocity, and barometric pressure or whatever you wanted to include.

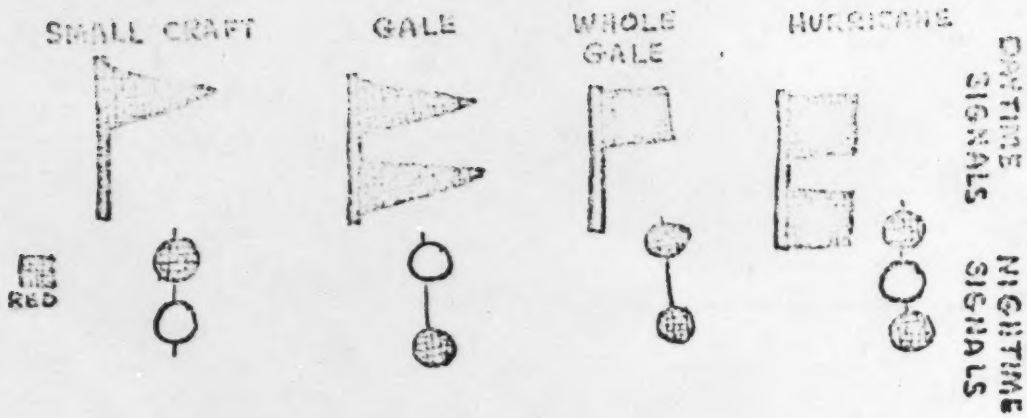
Make a chart or graph to report your information.

Weather-Watch Chart

Date					
Time of day					
Temperature					
Wind direction					
Wind speed					
Cloud type					
Cloud cover					
Precipitation in inches					
Barometric pressure					

MICROFILMED FROM
BEST AVAILABLE COPY

BEST COPY AVAILABLE



7. SEA SIGNALS YOU MIGHT STUDY

Here are some signals used by the U.S. Weather Bureau along the seacoast. Such signals are not as important now as they were before radio came into use.

However, they are still of historic interest.

What flags did ships fly to relay messages to each other in the old days?

Make some construction paper or cloth models of some of your favorite signal flags and display them.

MICROFILMED FROM
BEST AVAILABLE COPY

BEST COPY AVAILABLE

UNIT TEST A

Unit Weather

Result
Criteria 38/47

Name _____

Date _____

Marks
(10)

Exercise 1: Matching. Match the word or words in the left-hand column with the correct definition in the right-hand column.

_____1.	*Dew Point*	a.	Myth, legend
_____2.	*Cirrus*	b.	Instrument for measuring wind speed.
_____3.	*Humidity*	c.	A storm with winds to 200 mph and diameter to 400 miles
_____4.	*Cumulus*	d.	Huge blobs of air in the atmosphere.
_____5.	*Atmosphere*	e.	Amount of moisture in the air
_____6.	*Lore*	f.	Temperature at which air will no longer hold water
_____7.	*Anemometer*	g.	Puffy, balloon-like clouds
_____8.	*Hurricane*	h.	Whirling winds to 600 mph/ diameter average 200 yards
_____9.	*Air Masses*	i.	High, wispy clouds called "Mare's tails"
_____10.	*Tornado*	j.	Gases surrounding earth

Exercise 2:

What do the following instruments measure?

A. Thermometer _____

B. Barometer _____

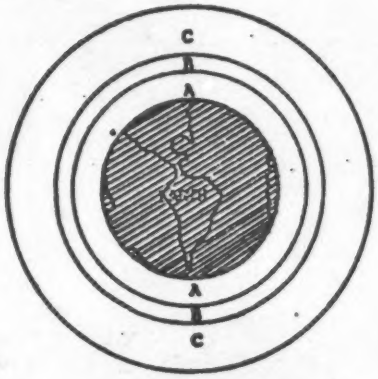
C. Hygrometer _____

D. Anemometer _____

MICROFILMED FROM
BEST AVAILABLE COPY

BEST COPY AVAILABLE

3. Give the name of each layer of the atmosphere.



a. _____

b. _____

c. _____

4. What five changes, or *"indicators"* do both the meteorologist and the amatuer forecaster use to predict weather?

a. _____

b. _____

c. _____

d. _____

e. _____

5. What is humidity? _____

6. What conditions are necessary to form dew?

_____

7. Define the word *meteorologist*. _____

_____

8. What does the following weather proverb about the hyrometer mean: *"Curls that kink and cords that bind:*
Signs of rain and heavy winds."

_____

_____

MICROFILMED FROM
BEST AVAILABLE COPY

BEST COPY AVAILABLE

9. What weather would a continental polar air mass most likely bring? _____

10. TRUE or FALSE

Write true or false before each of the following statements.

_____1. Warm air rises.

_____2. Land absorbs more heat than water.

_____3. Beuforts scale measures temperature.

_____4. Sea breezes appear cool by day, warm by night.

_____5. High and Low pressure are actually the same.

_____6. *"Red sky at night - sailor take warning"*

_____7. *"Woolly Bear"* is the name of a caterpillar.

_____8. Difference in atmospheric pressure causes wind.

_____9. Low pressure usually accompanies rain.

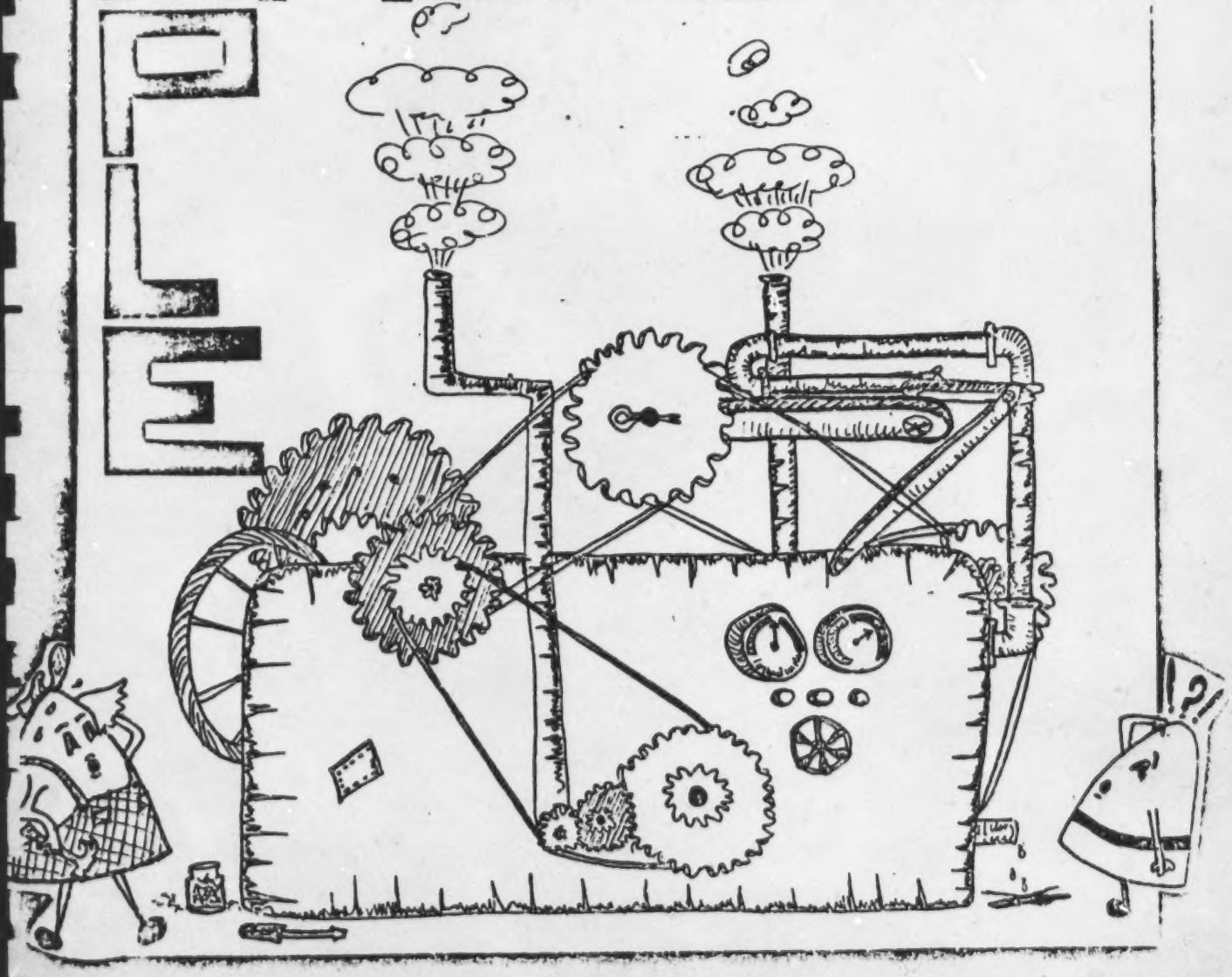
_____10. A summer fog usually indicates rain.

MICROFILMED FROM
BEST AVAILABLE COPY

BEST COPY AVAILABLE

SIMPLE MACHINES

UNIT 4.



BEST COPY AVAILABLE

INTRODUCTION

When we speak of a machine we usually mean a rather complicated device with hundreds of moving parts and powered by some sort of engine or electric motor. However, such simple devices as a hammer and a screwdriver are also machines.

To a scientist, a machine is any device which allows us to do work, exerting less force. For example, if we want to move a large rock, we might use a pry bar or a lever. The lever, which is a simple machine, allows us to move the rock with less force.

In using any simple machine, you never get out any more work than you put in. However, you do get an advantage. The advantage is that you don't have to use as much force.

In this unit we will study seven simple machines and learn how they operate.

MICROFILMED FROM
BEST AVAILABLE COPY

BEST COPY AVAILABLE

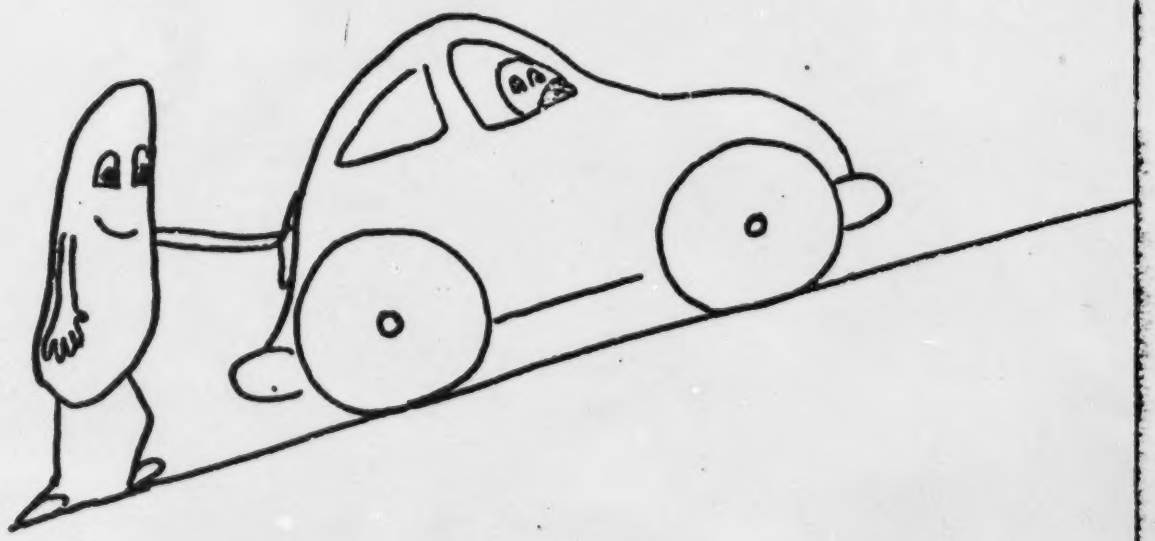
Objectives

1. You will understand and demonstrate the action of the simple machine called the inclined plane.

2. You will be able to identify examples of the inclined plane in your surroundings.

A.

INCLINED PLANE



BEST COPY AVAILABLE

UNIT 4: SIMPLE MACHINES

TOPIC A: INCLINED PLANE

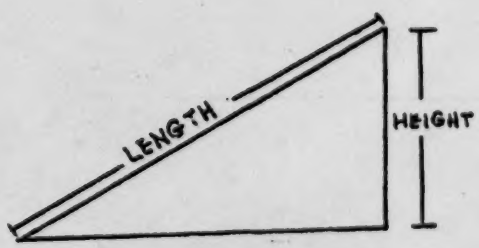
If you had to load a heavy barrel on a truck, it is quite likely that you would use a piece of plank and roll the barrel up on this. In doing this you are using a machine which is known as an *inclined plane*.

An inclined plane is a very simple machine that does not move. It is merely a slanting or sloping surface. When you are walking up a hill you are using an inclined plane.

You have probably seen many examples of the use of the inclined plane in your village. The inclined plane provides a way for you to lift a weight that is too heavy to lift directly.

In order to figure the *mechanical* advantage of using the inclined plane we can divide the length by the height, as shown in the example below:

$$\text{MECHANICAL ADVANTAGE (inclined plane)} = \frac{\text{Length of Plane}}{\text{Height of Plane}}$$



INCLINED PLANE

MICROFILMED FROM
BEST AVAILABLE COPY

BEST COPY AVAILABLE

The previous numbered page in the original document was blank

Sample problems to find the mechanical advantage of an inclined plane are listed below:

Sample Problems:

1. What is the mechanical advantage of an inclined plane which is 15 ft. long and 3 ft. high?

Solution:

$$\text{Mechanical Advantage} = \frac{\text{length}}{\text{height}}$$

$$= \frac{15 \text{ ft.}}{3 \text{ ft.}} = \underline{5}$$

2. A man uses a 20 ft. long plank to roll a barrel up to a truck which is 5 ft. high. What is the mechanical advantage of the plane?

Solution:

$$\text{Mechanical Advantage} = \frac{\text{length}}{\text{height}}$$

$$= \frac{20 \text{ ft.}}{5 \text{ ft.}} = \underline{4}$$

Read - No assignment listed

Supplemental Aids

Audio-Visual

FL 498-507 Simple Machines (IMC Kodiak)

Transparency #203 (IMC Kodiak)

Activities

(1) Find the mechanical advantage of the following:

1. An inclined plane is 16 ft. long and 4 ft. high. What is the mechanical advantage of the plane?

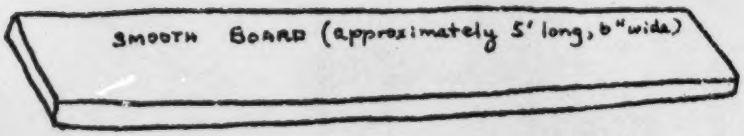
2. A man uses a piece of plank 10 ft. long to lift a barrel on to a truck 2 ft. high. What is the mechanical advantage of the plane?

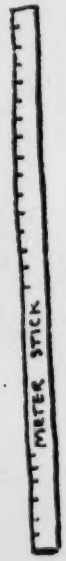
MICROFILMED FROM
BEST AVAILABLE COPY

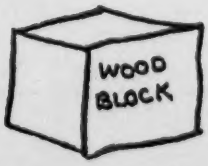
BEST COPY AVAILABLE

(2) Find several examples of the use of inclined planes around your village. Either draw or take pictures of them. Put them in a notebook to show to the class.

(3) Using the materials pictured, make an inclined plane and be able to demonstrate its use before a small group of students. For variation, show how the mechanical advantage can be changed. (Note: substitutes in materials may be needed.)







(4) Fill a cardboard box full of sand, books, or rocks. Set it on the floor. (Note: Make sure it takes at least two people to place it down.) Another student must be able to figure out how to lift the box onto a low sturdy table using only boards or planks.

MICROFILMED FROM
BEST AVAILABLE COPY

BEST COPY AVAILABLE

Objectives

1. You will be able to explain the meaning of the terms fulcrum, effort and resistance.

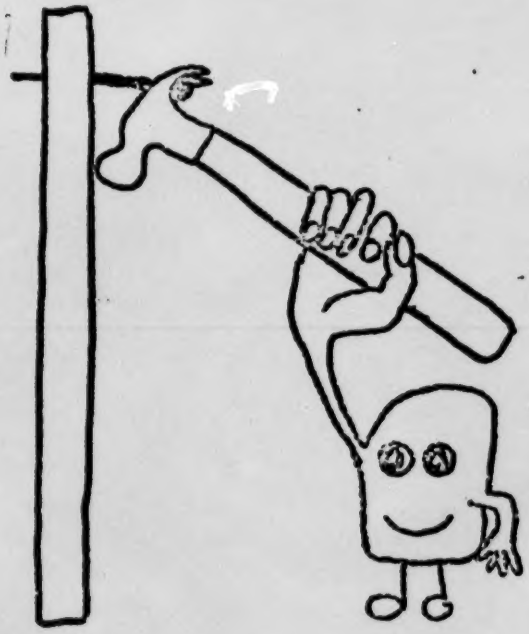
2. You will be able to calculate the mechanical advantage of a lever given the effort arm and the resistance.

3. You will be able to know the various types of levers.

4. You will be able to demonstrate the action of a lever.

B.

LEVERS



MICROFILMED FROM
BEST AVAILABLE COPY

BEST COPY AVAILABLE

The previous numbered page in

UNIT 4: SIMPLE MACHINES

TOPIC B: LEVERS

Have you ever used a hammer to draw a nail out of a piece of board? Have you ever used a screwdriver to open a tin of paint? Have you ever used a wheelbarrow? If you have done any of these things, you have used a *lever*. We note that in each of these cases we are using some sort of a rigid body which is free to turn about some point. For the wheelbarrow, this turning point is the axle of the wheel; for the hammer, it is the rounded section near the claws, etc. This point or pivot about which the body is free to turn is called the *fulcrum*. As in the case of other machines, the force we exert is called the *effort* and the *load* we lift or move is called the *resistance*. The distance from the effort to the fulcrum is called the *effort arm*, and the distance from the fulcrum to the resistance is called the *resistance arm*.

Figure (1) below indicates these quantities for the case of a lever used to lift a stone:

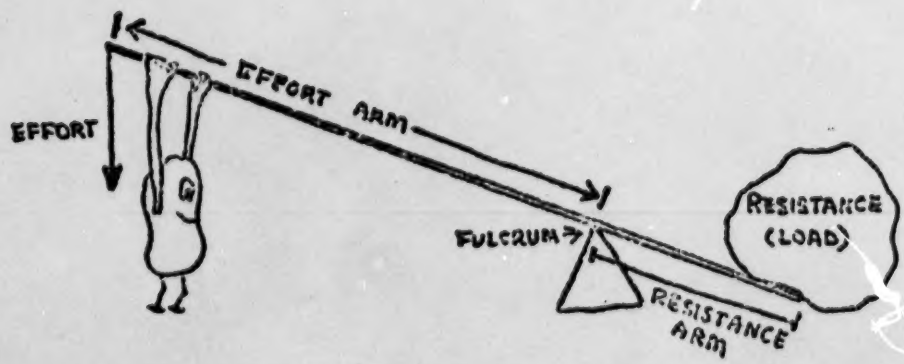
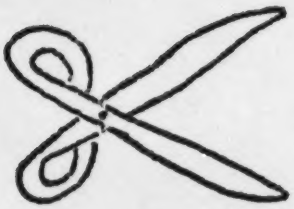


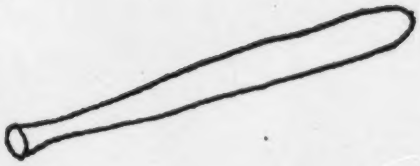
Figure (1)

MICROFILMED FROM
BEST AVAILABLE COPY

BEST COPY AVAILABLE

Thus, in Figure (1) three things are needed to make the lever. 1) *EFFORT*, which is the force needed to lift the load. 2) The *FULCRUM* which is the turning point and, 3) *LOAD*, which is the weight lifted. Knowing the parts of a lever and what they do, see if you can find the position of the effort, load, and fulcrum in each picture below:





There are many levers around you. Most of them are used to increase force. Some common examples of these include pliers, scissors, wheelbarrows, hammers, and boat oars.

Some levers are used to increase speed. Two examples would be the fishing rod and the baseball bat.

MICROFILMED FROM
BEST AVAILABLE COPY

BEST COPY AVAILABLE

There are three classes of levers. Each class can be determined by where the fulcrum, effort and resistance are placed. A seesaw would be an example of a first-class-lever because the fulcrum is usually in the center.

A bottle opener is an example of a second-class-lever because the resistance which is the edge of the bottle cap is between the fulcrum and effort.

Any type of shovel could be classed as a third type of lever. When you lift a load of dirt the effort to lift comes from your hand on the shaft of the handle. Your other hand on the end of the handle end of the shovel serves as the fulcrum. Examples of classes of levers and where each part is located are listed on the next page.

The mechanical advantage of using any lever can be found by dividing the effort arm by the resistance arm. Writing it in a formula we have:

$$\text{Mechanical Advantage (Lever)} = \frac{\text{Effort Arm}}{\text{Resistance Arm}}$$

Sample problems to find the mechanical advantage of a lever are listed below.

Sample Problems:

1. The effort arm of a lever is 6 ft. long and the resistance arm is 1 ft. long. What is the mechanical advantage of the lever?

Solution:

$$\text{Mechanical Advantage} = \frac{\text{Effort Arm}}{\text{Resistance Arm}}$$

$$= \frac{6 \text{ ft.}}{1 \text{ ft.}} = \underline{6}$$

2. A lever is 10 ft. long. If the fulcrum is placed 2 ft. from the end, where the resistance is placed, what is the mechanical advantage of the lever?

Solution:

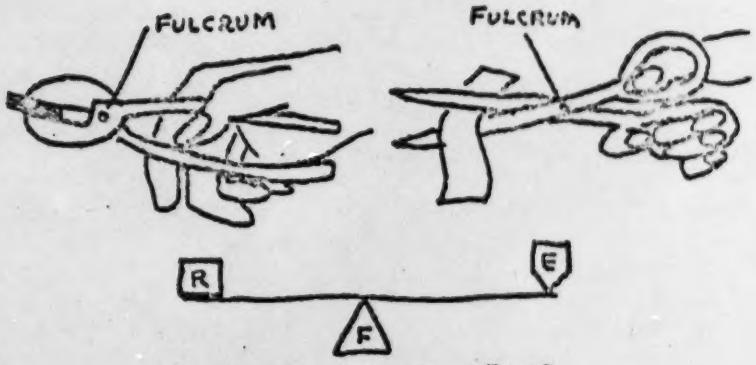
$$\text{Mechanical Advantage} = \frac{\text{Effort Arm}}{\text{Resistance Arm}}$$

$$= \frac{8 \text{ ft.}}{2 \text{ ft.}} = \underline{4}$$

MICROFILMED FROM
BEST AVAILABLE COPY

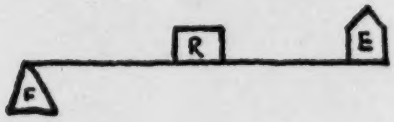
BEST COPY AVAILABLE

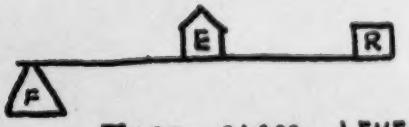
THREE CLASSES OF LEVERS



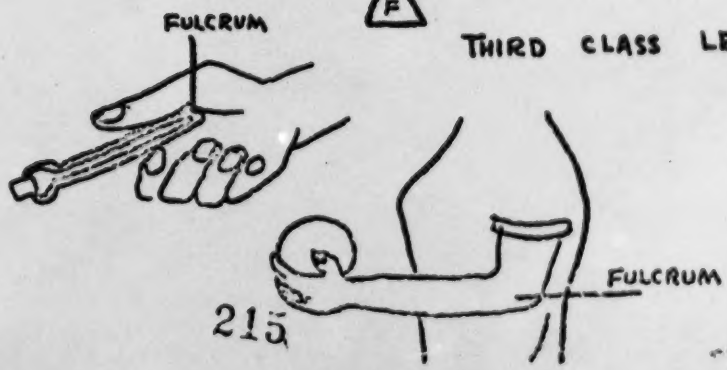
FIRST CLASS LEVER

SECOND CLASS LEVER





THIRD CLASS LEVER



MICROFILMED FROM
BEST AVAILABLE COPY

BEST COPY AVAILABLE

Sometimes we want to raise a heavier load. To do this we need to increase the lever's mechanical advantage. How can we do this? We are all well aware that we can lift someone much heavier than our self on a seesaw if we move further away from the center. Effectively we are increasing the effort arm. Or we could request that the other person move closer to the center; this effectively is shortening our resistance arm and enables us to increase the mechanical advantage. Thus we can increase the mechanical advantage of a lever either increasing the effort arm, decreasing the resistance arm, or both.

READ: No reading assignment

SUPPLEMENTAL AIDS:

Audio-Visual: FL-498-507 SIMPLE MACHINES (IMC Kodiak)

Transparency #201 (IMC Kodiak)

ACTIVITIES:

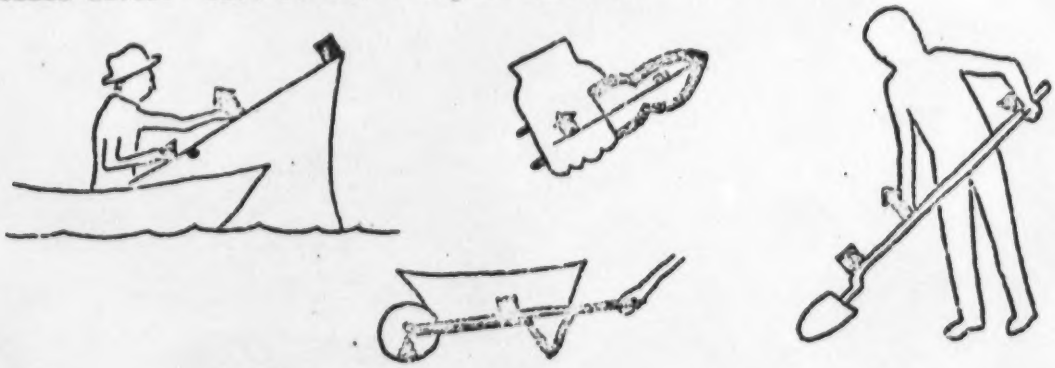
1. Find the mechanical advantage of the following:

QUESTIONS:

a) *What is the mechanical advantage of a lever whose effort arm is 10 ft. and the resistance arm is 2 ft.?*

b) *A lever is 21 ft. long and the fulcrum is place 3 ft. from one end. What is the mechanical advantage?*

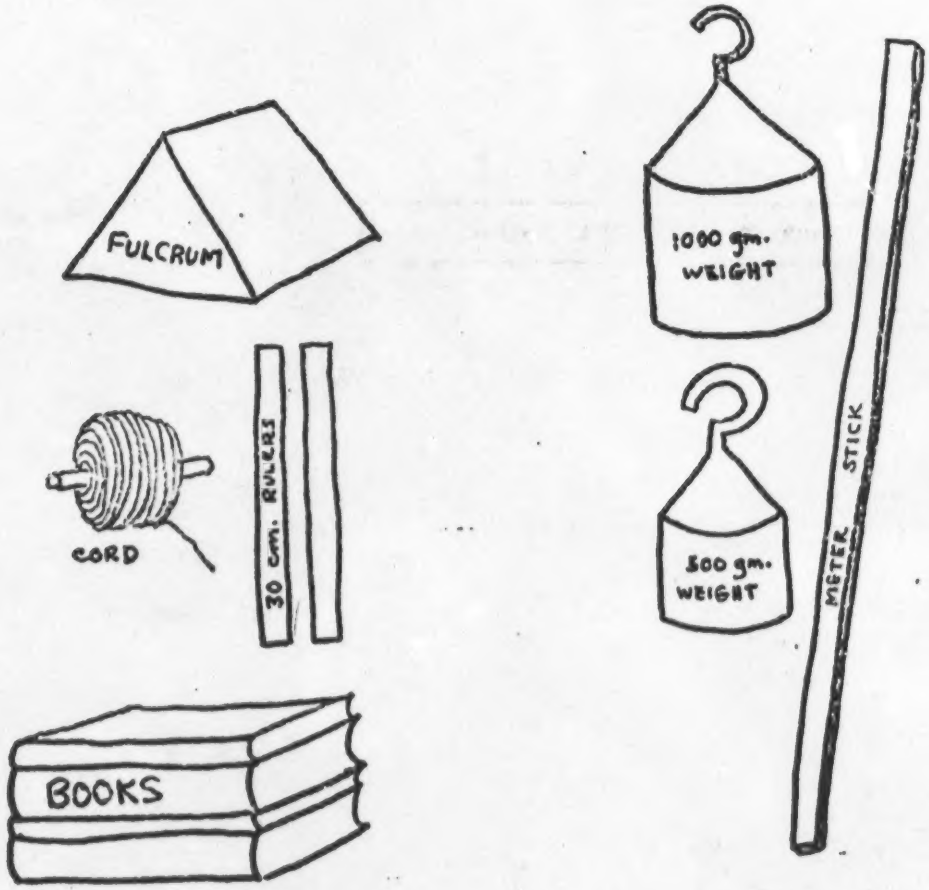
2. Each of the pictures below is an example of a lever. *Identify* each lever and be able to tell whether it is a first, second, or third class lever. Give reasons for your answers.



MICROFILMED FROM
BEST AVAILABLE COPY

BEST COPY AVAILABLE

(3) Using the materials pictured, construct a lever and be able to demonstrate how it works before the class. Be able to show how the lever you constructed makes it possible to move the weight with less effort. (Note: Materials may be substituted for the materials below.)



MICROFILMED FROM
BEST AVAILABLE COPY

BEST COPY AVAILABLE

Objectives

1. You will understand how to use the simple machine called a wheel and axle.

2. You will learn the mechanical advantage of the wheel and axle.

3. You will be able to identify examples of a wheel and axle.

C.

WHEELS AND AXLES

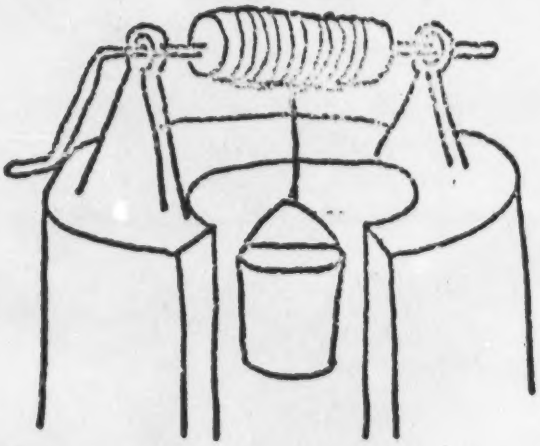
MICROFILMED FROM
BEST AVAILABLE COPY

BEST COPY AVAILABLE

UNIT 4: SIMPLE MACHINES

TOPIC C: WHEELS & AXLES

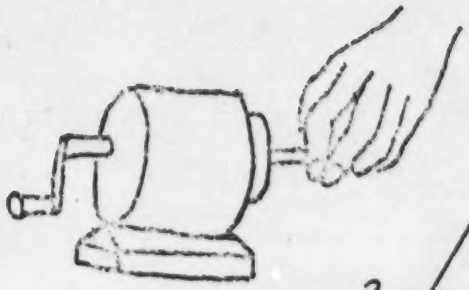
Another simple machine which is a modified lever is a *wheel and axle*. When you turn the doorknob to open the door you are using a wheel and axle. The machine consists of a large wheel attached to a shaft called an axle. In the case of the door, the knob serves as the wheel whereas the shaft serves as the axle. The wheel does not turn on the axle. Instead the wheel and axle turn together. A good example of the wheel and axle is a winch used to raise water from a well. In the illustration, the handle is the wheel.



Other examples of the wheel and axle are the pencil sharpener and the pedals on the bicycle which are shown in illustrations 2 and 3 on the following page.

MICROFILMED FROM
BEST AVAILABLE COPY

BEST COPY AVAILABLE



2.

3.

In order to figure out the mechanical advantage of wheel and axle we divide the radius of the wheel by the radius of the axle.

$$\text{Mechanical Advantage (Wheel and Axle)} = \frac{\text{Radius of Wheel}}{\text{Radius of Axle}}$$

Note: If the diameter is given in a problem instead of the radius divide the diameter by 2 to get the radius.

A sample problem in finding the mechanical advantage of a wheel and axle is listed below:

Sample Problem:

1. What is the mechanical advantage of a wheel and axle system whose wheel has a radius of 12 in. and whose axle is 4 in.?

Solution:

$$\text{Mechanical Advantage} = \frac{\text{Radius of Wheel}}{\text{Radius of Axle}}$$

$$= \frac{12 \text{ in.}}{4 \text{ in.}} = 3$$

MICROFILMED FROM
BEST AVAILABLE COPY

BEST COPY AVAILABLE

Supplemental Aids

Audio-Visual
FL 498-507 Simple Machines (IMC Kodiak)

Transparency #204 (IMC Kodiak)

Activities

(1) Locate some examples of the use of a wheel and axle in your village. Make drawings of them or take pictures if you have a camera. Show them to others in your class.

(2) Find the mechanical advantage of the following problems:

Questions:

1. A man uses a wheel and axle system whose wheel has a radius of 15 in. and whose axle has a radius of 3 in. What is the mechanical advantage of the machine?

2. A winch whose handle is 1 1/2 ft. long and whose axle has a diameter of 6 in. is being used by a person to haul a boat ashore. What is the mechanical advantage of the machine?

3. Draw a diagram of a wheel and axle which has a mechanical advantage of four.

MICROFILMED FROM
BEST AVAILABLE COPY

BEST COPY AVAILABLE

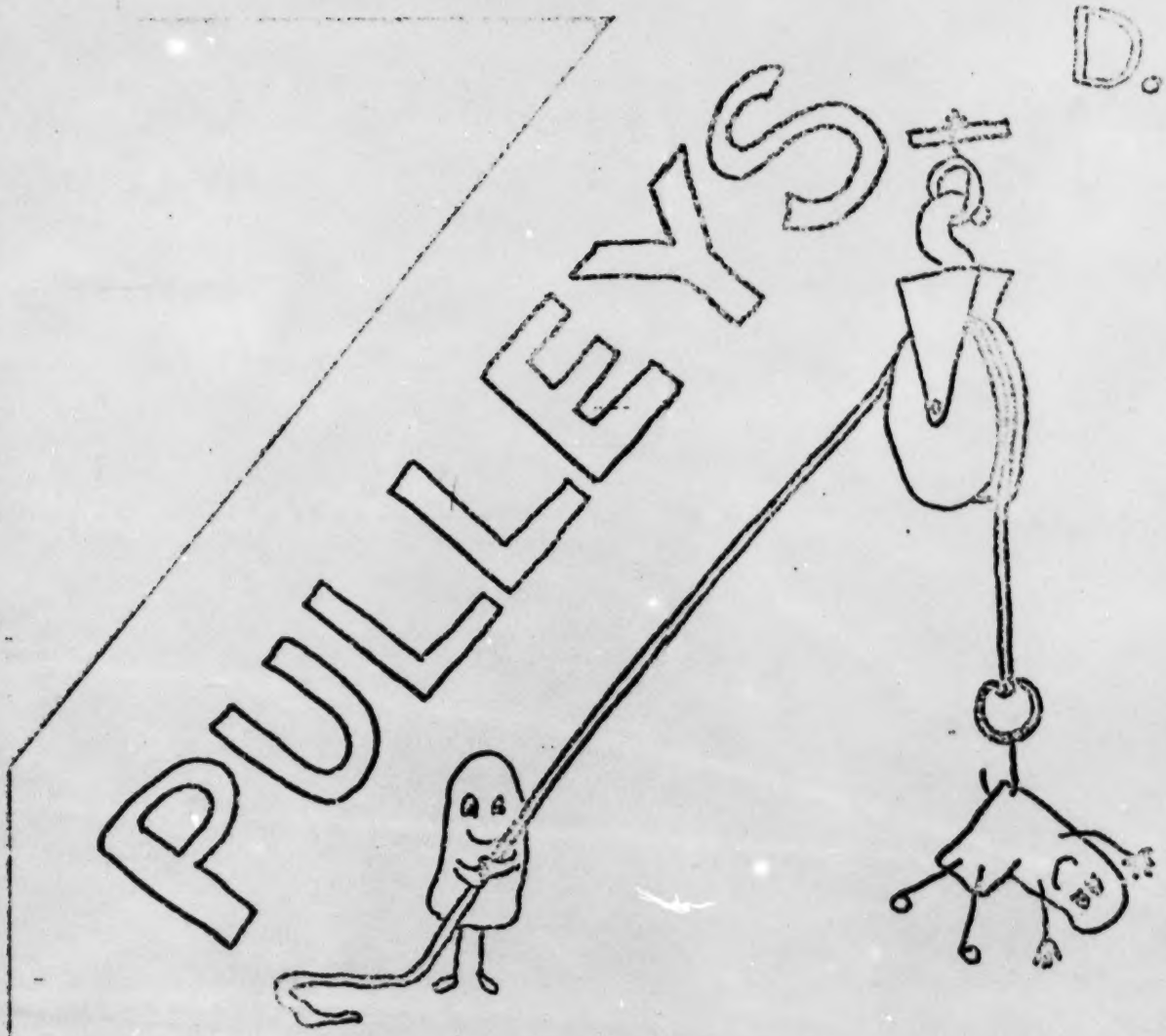
Objectives

1. You will understand the difference between a fixed and a movable pulley.

2. You will be able to identify various pulleys.

3. You will be able to figure the mechanical advantage of a pulley.

4. You will be able to construct fixed and movable pulleys and demonstrate their uses.



BEST COPY AVAILABLE

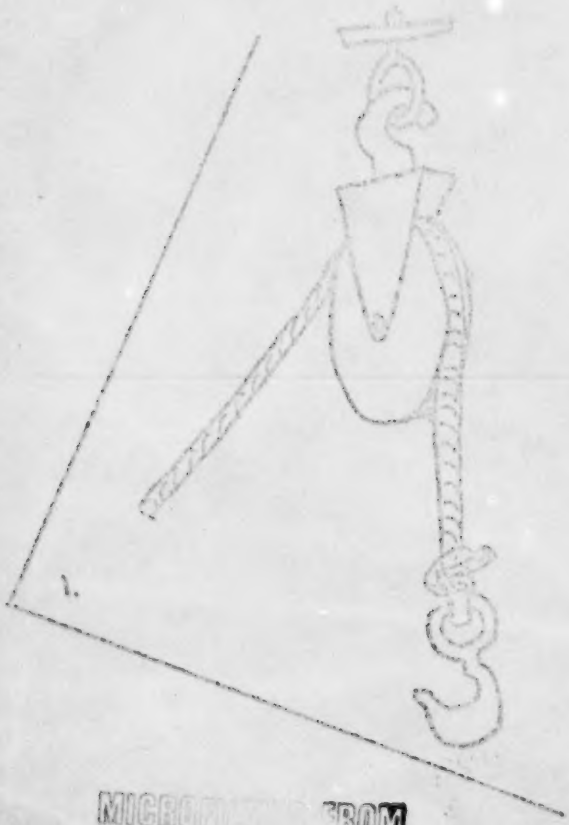
(D) The Pulley

Another wheel-like machine that acts like a lever is the pulley. A pulley consists of a wheel that has a groove in it. A rope goes into this groove. A load is placed at one end of the rope. As you pull the rope, the wheel begins to move and the load is lifted. The pulley makes it easy to lift the load.

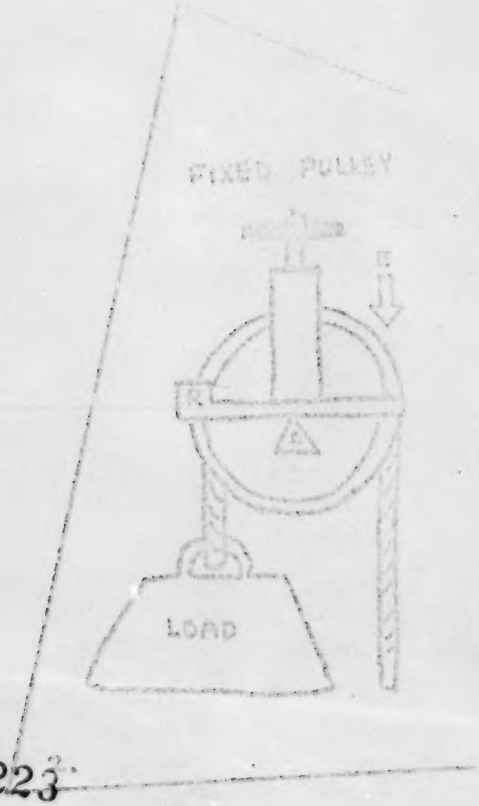
Pulleys are used for many jobs. For instance, your window shades in your classroom are pulled up by a cord using a pulley. Perhaps you have used pulleys to lift supplies from a boat up onto a dock.

There are two main types of pulleys. They are the fixed pulley and the movable pulley.

A fixed pulley is attached to a support such as a wall, a ceiling, or a flag pole. It never moves even if the load moves. Illustrations #1 and #2 show examples of fixed pulleys.



1.



2.

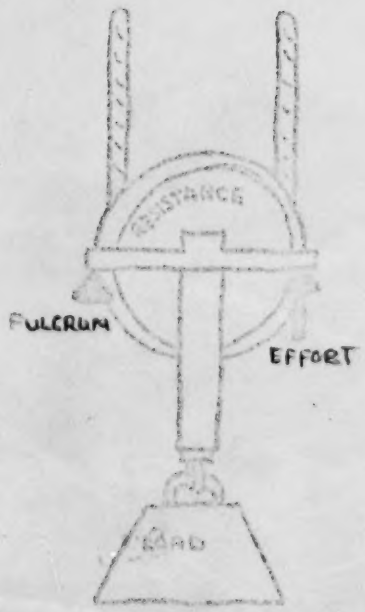
MICROFICHE FROM
BEST AVAILABLE COPY

BEST COPY AVAILABLE

The previous numbered page in the original document was blank.

A movable pulley is attached to the load or resistance. It moves as the resistance moves. Examples of movable pulleys are shown in illustrations #3 and #4 below.

3.



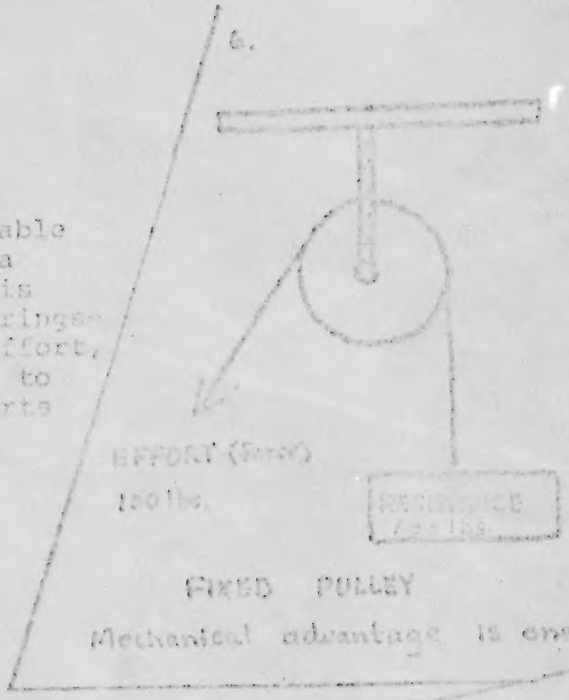
4.

MOVEABLE PULLEY

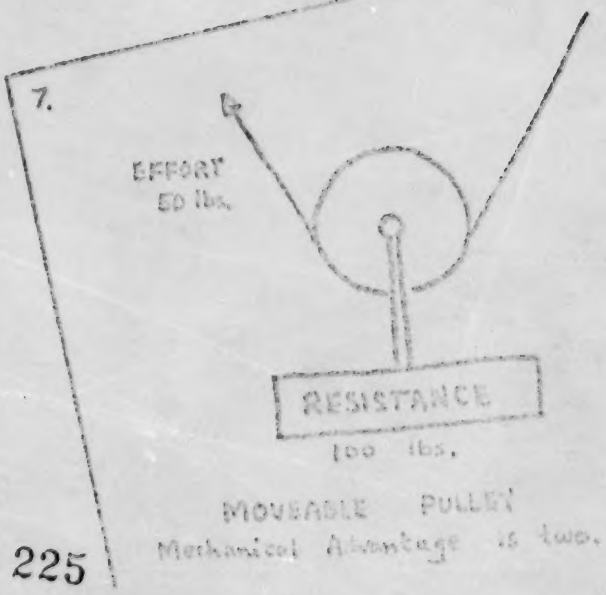
MICROFILMED FROM
BEST AVAILABLE COPY

BEST COPY AVAILABLE

The mechanical advantage of using the pulley system is equal to the number of strings supporting the load. For the case of the fixed pulley, if we have a load of 100 lbs. to lift, we are going to have to exert a force of 100 lbs. to lift this load. In other words the mechanical advantage is one. (Look at illustration #6)



In the case of the movable pulley, if we have to lift a load of 100 lbs., the load is supported equally by two strings, one on which we exert the effort, and the other which is tied to something. Each rope supports an equal amount of force which in this case is 50 lbs. To lift the load using the movable pulley we have to exert an effort of 50 lbs. Our mechanical advantage is two. (Look at illustration #7)



MICROFILMED FROM
BEST AVAILABLE COPY

BEST COPY AVAILABLE

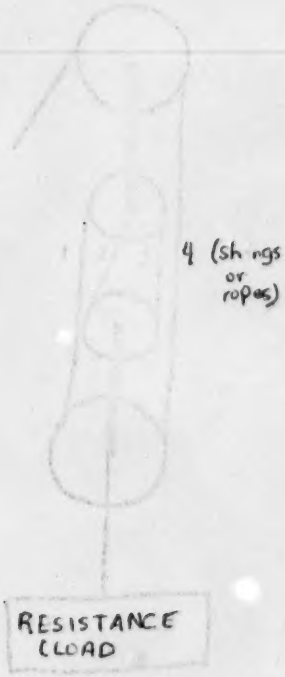
Most pulley systems have more than one pulley and usually the rope is wound around more than once. Such a system is commonly known as a block and tackle. A block and tackle is a machine made up of a fixed pulley and a movable pulley connected by one or more ropes. Illustration #5 shows a block and tackle lowering a boat into the water.

MICROFILMED FROM
BEST AVAILABLE COPY

BEST COPY AVAILABLE

If we use the block and tackle machine in which there are four strings supporting the load, we would expect that each string supports one quarter of the load. Thus, only one quarter of the weight of the load is needed to lift it. We may say that the mechanical advantage is four. (Look at illustration #8.)

Thus, as a general rule we may say the mechanical advantage of the pulley system is equal to the number of strings which support the load.



mechanical advantage is four.

Read - No Reading Required

Supplemental Aids

Audio-Visual

FL 497-507 Simple Machines (IMC Kodiak)

Transparency #205 (IMC Kodiak)

8.

Activities

(1) Draw 3 examples of the use of the pulley in your village. (Use colored pencils if you wish.)

(2) Answer the following:

What is the mechanical advantage of a block and tackle system which has five strings supporting the load?

What is the mechanical advantage of the pulley system shown at the right?

BEST COPY AVAILABLE

The diagram below represents a block and tackle system used to pull a car back on the road. Show how you would wind ropes around the pulleys to obtain the maximum mechanical advantage.

(3) Following is a list of materials that are needed to make a pulley. Using these materials do the following:

(a) Construct a fixed pulley and demonstrate its use before a group of students.

(b) Construct a movable pulley and demonstrate its use before a group of students.

(Note: You might want to use illustrations #9 and #10 to see how to construct the pulleys.)

meterstick

spring balance

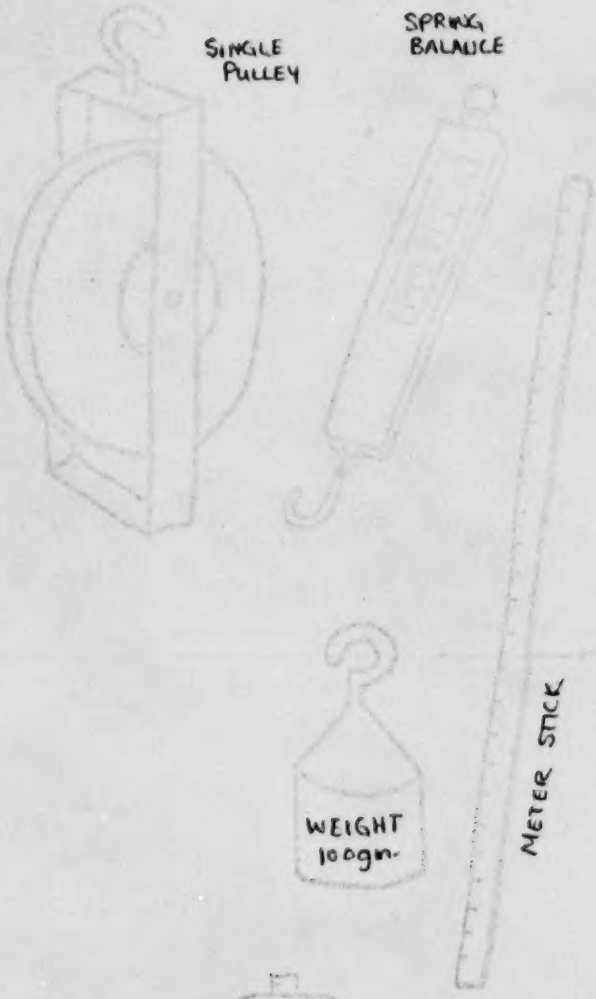
single pulley

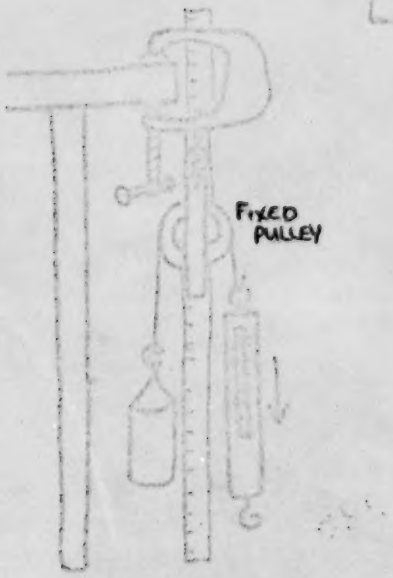
C clamp

strong cord

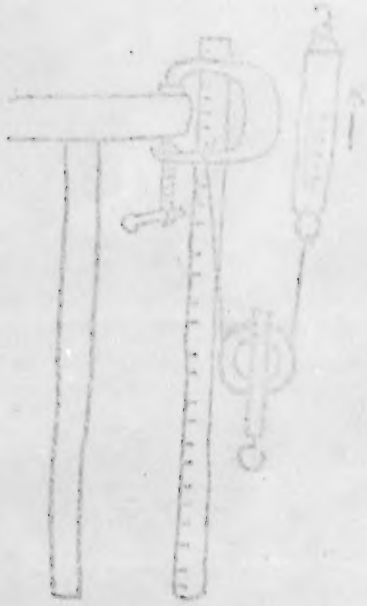
weight

MICROFILMED FROM
BEST AVAILABLE COPY





#9



#10

BEST COPY AVAILABLE

MICROFILMED FROM BEST AVAILABLE COPY

Objectives

1. You will understand that the simple machines, the wedge and the screw are special kinds of inclined planes.

2. You will be able to identify examples of the wedge and the screw.

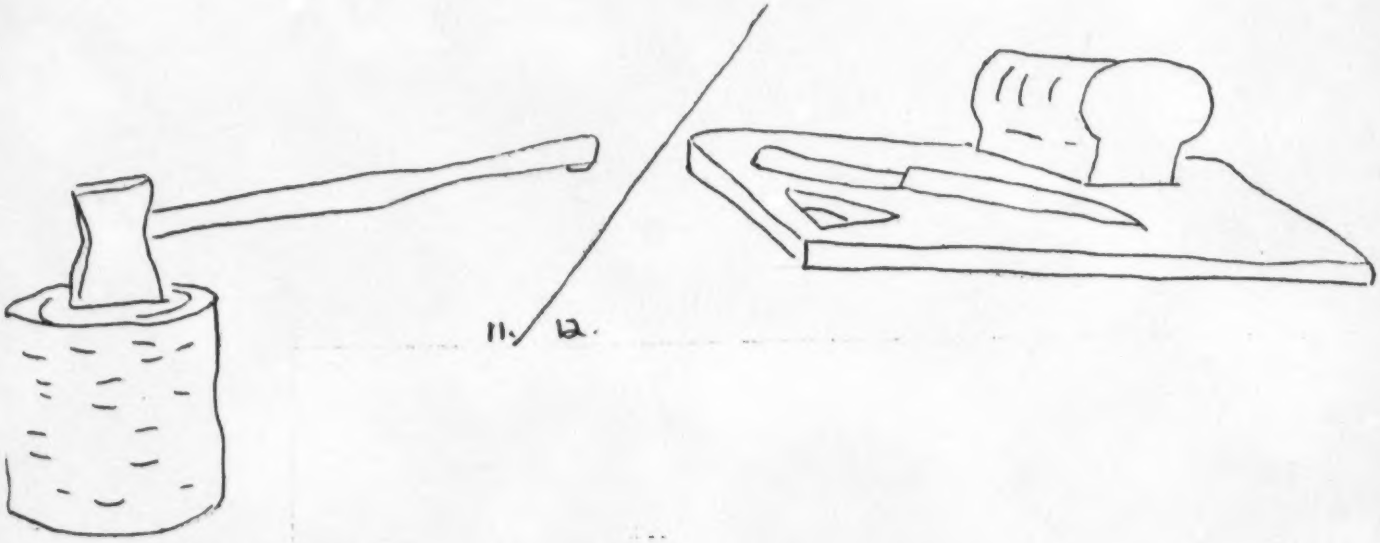
E.

WEDGE AND SCREW

BEST COPY AVAILABLE

(E) The Wedge and the Screw

A wedge is a double inclined plane. Wedges are useful in forcing objects apart. One example of a wedge is the ax you use to chop wood or cut down trees. Another wedge you use is the cutting or hunting knife. It is a thin inclined plane that you force into an object to split it apart. Examples of the wedges above are shown in illustrations #11 and #12.



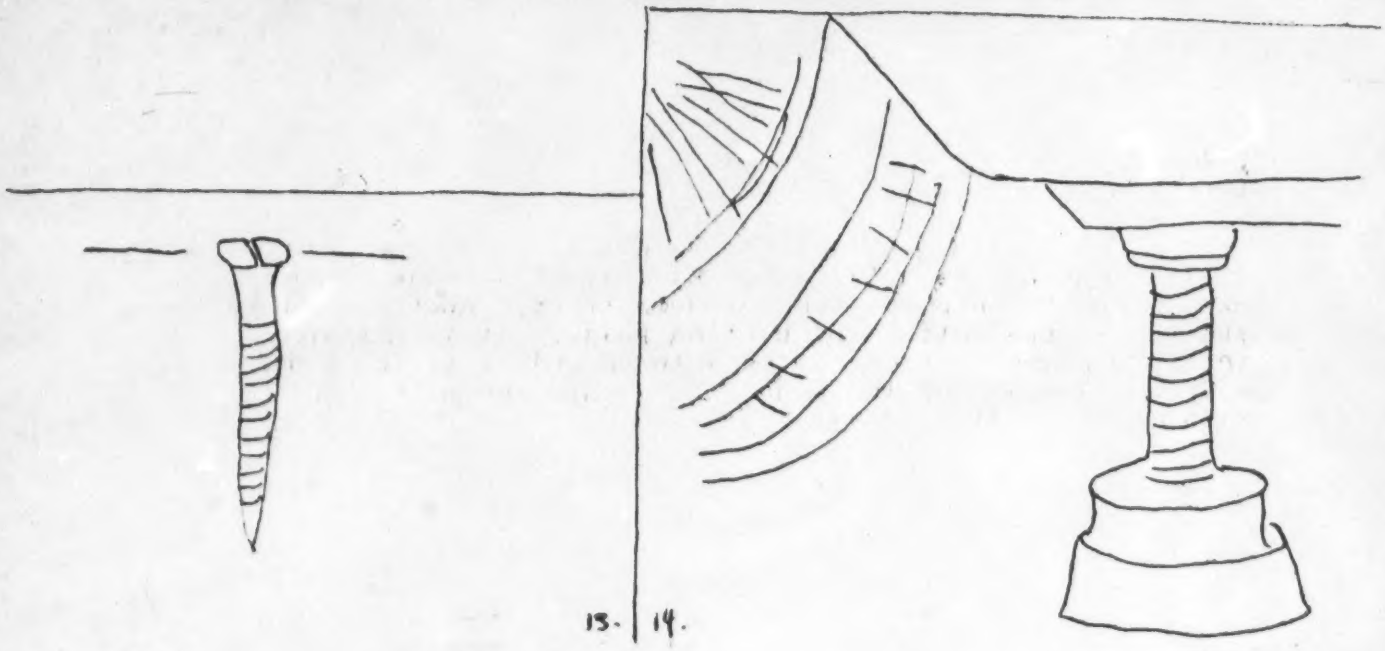
11. 12.

The screw is another special kind of inclined plane. If you were to turn a screw into a piece of wood, you would notice that the turning screw acts like an inclined plane

Screws involve a great amount of friction. (Friction is resistance caused by rubbing two objects against each other.) Without this fraction, screws would not be very useful. For instance, screws would twist out of your furniture, causing it to fall apart if friction was not present.

Some examples of screws are shown in illustrations #13 and #14.

BEST COPY AVAILABLE



Reading - No Reading Assignment

Supplemental Aide

Audio-Visual

FL 498-507 (IMC Kodiak)

Activities

(1) Demonstrate how the simple machine, the screw, works using the following materials:

(a) screwdriver
(b) screw
(c) piece of board about 6 in. thick

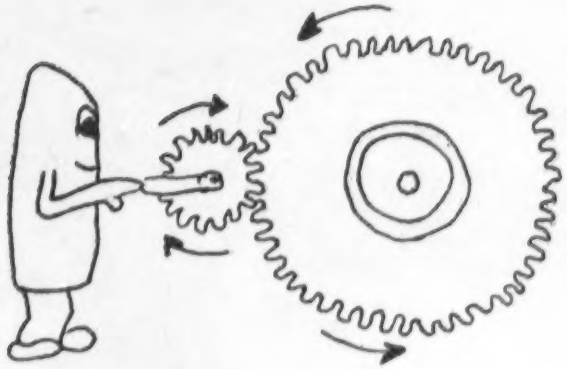
For variation also use nail and hammer and pound nail into the board. What advantages would you find by using the screw over the nail?

(2) In a short paragraph (4 to 5 sentences) explain how you use the simple machine, the wedge in your village. You may also draw pictures to explain.

Objectives

1. You will learn how to identify the simple machine, the gear.

2. You will be able to demonstrate how gears work.



F. GEARS

MICROFILMED FROM
BEST AVAILABLE COPY

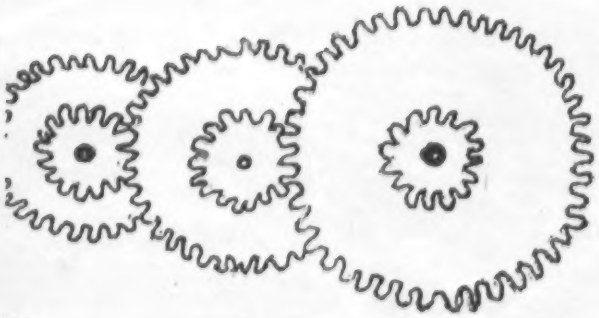
BEST COPY AVAILABLE

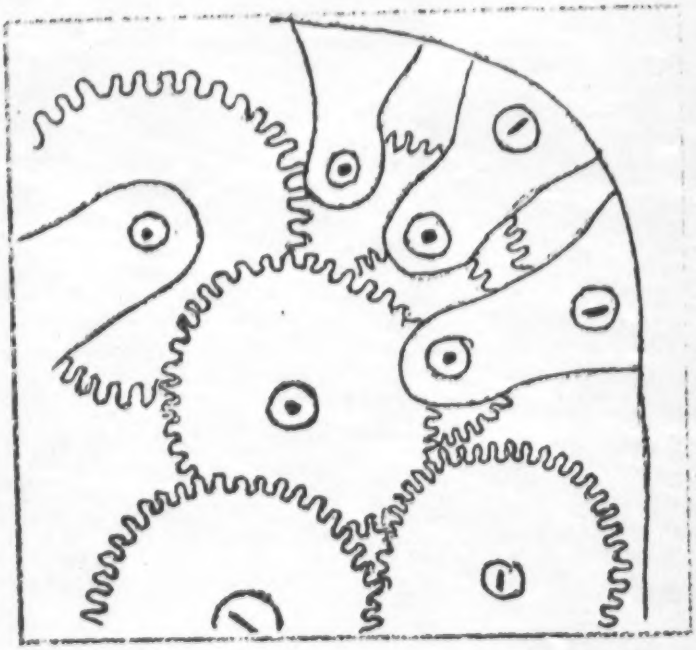
(F) The Gear

The gear is a kind of wheel-like machine that acts like a lever. If you looked at a gear you would notice that it is a wheel that has "teeth" around its edges. (Look at illustration below.)

Gears can move other gears. This can be done by making the teeth of one gear fit between the teeth of another gear. Clocks and watches have gears that are put together this way. (Look at illustrations below) The hands of a clock turn at different speeds by using gears of different sizes.

Other examples of machines that have gears in them include airplane engines, boat engines, hand drills, and bicycles.





#16

BEST COPY AVAILABLE

Read - No Reading Assignment

Supplemental Aids

Audio-Visual

FL 498-507 (IMC Kodiak)

Activities

(1) If you have an old watch or clock that doesn't work or keep good time take it apart and locate the gears. Be able to explain how the gears work.

(2) Make a list of things that use gears. Draw pictures or sketches of them.

MICROFILMED FROM
BEST AVAILABLE COPY

UNIT TEST

UNIT SIMPLE MACHINES

Exercise I

Next to each machine on the left, put the correct letter from the definitions:

1. _____ inclined plane

2. _____ lever

3. _____ wheel and axle

4. _____ pulley

5. _____ wedge

6. _____ screw

7. _____ gear

(a) This machine is a double inclined plane.

(b) A simple machine that is a slanting or sloping surface.

(c) This is a wheel-like machine that has "teeth" around its edges.

(d) This machine can be fixed or movable.

(e) There are three classes of this machine.

(f) This machine would not be very useful without a large amount of friction. (Your furniture might be held together by this machine.)

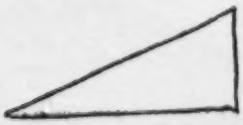
(g) This machine is made up of a wheel attached to a shaft.

MICROFILMED FROM
BEST AVAILABLE COPY

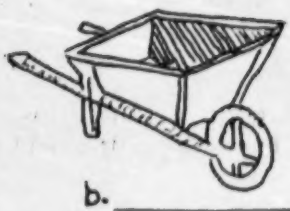
BEST COPY AVAILABLE

EXERCISE 2:

Under each picture write the name of the simple machine:



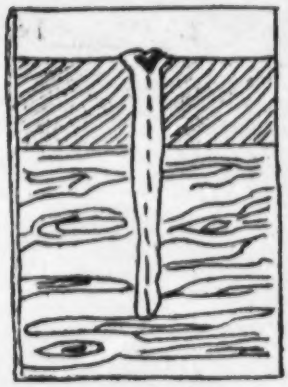
a._____



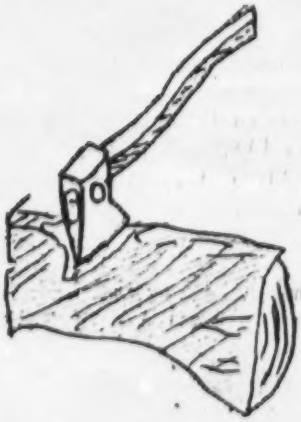
b._____

c._____

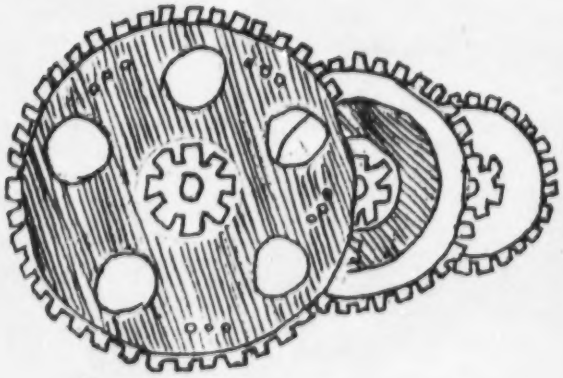
d._____



e._____



f._____



g._____

BEST COPY AVAILABLE

Exercise 3

Find the mechanical advantage of the following:

1. An inclined plane which is 16 ft. long and 4 ft. high.

2. The effort arm of a lever which is 10 ft. and a resistance arm which is 2 ft.

3. A wheel and axle whose wheel has a radius of 18 in. and whose axle is 6 in.

4. A pulley which a load is supported by two strings.

Exercise 4

Write in the blanks the simple machine you would use in each of the following situations.

1. You want to load some heavy boxes onto your boat.

2. You want to cut some paper for an art project.

3. You use a pencil sharpener to sharpen your dull pencils.

4. You want to lower your skiff from a large boat into the water.

5. You need to chop some fire wood for your wood stove.

BEST COPY AVAILABLE

Exercise 3

Find the machanical advantage of the following:

1. An inclined plane which is 16 ft. long and 4 ft. high.

2. The effort arm of a lever which is 10 ft. and a resistance arm which is 2 ft.

3. A wheel and axle whose wheel has a radius of 18 in. and whose axle is 6 in.

4. A pulley which a load is supported by two strings.

Exercise 4

Write in the blanks the simple machine you would use in each of the following situations.

1. You want to load some heavy boxes onto your boat.

2. You want to cut some paper for an art project.

3. You use a pencil sharpener to sharpen your dull pencils.

4. You want to lower your skiff from a large boat into the water.

5. You need to chop some fire wood for your wood stove.

BEST COPY AVAILABLE

The previous numbered page in the original document was blank.

ANSWER KEY - UNIT TEST 1

Exercise #1

1. living
2. joints
3. muscle
4. respiratory
5. digestive
6. blood vessels
7. bladder
8. nervous system
9. endocrine system
10. eye
11. eye
12. reproductive system
13. red blood cell
14. respiratory system
15. digestive system
16. testes
17. cerebrum
18. reproductive system
19. blood vessels
20. auditory nerve

Exercise 2

1. salivary glands
2. esophagus
3. stomach
4. small intestine
5. large intestine
6. liver

Exercise 3

Sample Answer

Voluntary muscles are muscles you control. Involuntary muscles are muscles you have no control. eg. muscles in the heart.

Exercise 4

1. mouth
2. nose
3. bronchial tubes
4. lungs
5. trachea
6. windpipe

Exercise 5

Sample Answers

arteries - carry blood from the heart to the body.

veins - carry blood from the body to the heart.

heart - pumps the blood.

BEST COPY AVAILABLE

The previous numbered page in the original document was blank

ANSWER KEY - UNIT TEST 1

Exercise 6

1. cerebrum
2. cerebellum
3. spinal cord
4. medulla

Exercise 7

Sample Answer

Our blood would not be able to remove waste products from our bodies.

Exercise 8

Sample Answer

This gland produces the growth hormone which is important during your growing years.

Exercise 9

1. cornea
2. pupil
3. lens
4. iris
5. retina

MICROFILMED FROM
BEST AVAILABLE COPY

UNIT 2: FIRST AID & ACCIDENT PREVENTION

TEST A: ANSWER KEY

RESULT: 100 CRITERIA: 80/100

1. Apply direct pressure (3).

2. Break in the skin (3).

3. a)Weakness
   b)Pale skin
   c)Increased breathing
   Nausea, increased pulse(3)

4. a)Lack of oxygen
   b)Burns
   c)Severe bleeding
   (heart attack, fear, pain, poisening) (3)

5. Lying down (3).

6. Begin at one (do not wait) (3).

7. Until the victim has revived or until a doctor has pronounced the victim dead (3).

8. a)Clear mouth
   b)Tilt head back
   c).Make a good seal
   d)Breath forcefully (4)

9. Third degree burn (3)

10. Immerse the area in cold water (3)

11. Do not put snow on affected areas, do not rub affected area (3)

12. Aspirin (3)

13. In the case of corrosives: gasoline, alkali, strong acid, petroleum products (3)

14. a)Fuel b)Oxygen c)Kindling temperature (heat) (3)

15. Prevention (3)

16. a)Wood, paper, etc. b)Oil c)Electrical (3)

242

BEST COPY AVAILABLE

17. a)Get everyone outside b)Close all the doors and windows (3)

18. a)Raingear b)Full match container c)Signal (whistle, mirror, flair, etc.) (3)

19. a)Shivering b)Slow reaction c)Dilated eyes (confusion, clumsiness, difficulty speaking) (3)

20. Victim must be warmed immediately - dry and immerse in warm bath, wrap in blankets, press another body against, etc. (3).

21. 12 points (3)

22. Regulatory B Stop A
Yield C Warning D (4)

Essay: Explain in complete sentences or complete outline form what FIRST AID you would give in the following situations and the order in which you would give it:

1)Leona has fallen from a tree. She is badly cut above the eye and is unconscious. She is not breathing. (16)

TEACHER JUDGMENT

2)Benny-bo has been badly burned in a house fire. His clothes are charred and sticking to his skin. His eyes are dilated and his breathing and pulse are rapid. You have helped him out of the house and his is standing twenty feet from the flames. What should you treat for? How would you do it? (16)

TEACHER JUDGMENT

BEST COPY AVAILABLE

UNIT TEST A

Answer Key Unit 3 - Weather

Exercise 1

1.	f	6.	a
2.	i	7.	b
3.	e	8.	c
4.	g	9.	d
5.	j	10.	h

Exercise 2

A. temperature
B. air pressure
C. relative humidity
D. wind speed

Exercise 3

A. troposphere
B. stratosphere
C. ionosphere

Exercise 4

A. air pressure
B. temperature
C. wind direction
D. wind speed
E. humidity

Exercise 5

moisture in the air

Exercise 6

lack of clouds, windless night

Exercise 7

a scientist who studies and predicts weather

Exercise 8

Hair and fibers absorb moisture and shorten with increased humidity.

Exercise 9

cold and dry

Exercise 10

1. true
2. false
3. false
4. true
5. false
6. false
7. true
8. true
9. true
10. false

BEST COPY AVAILABLE

Answer Key - Unit 4 Simple Machines

Exercise I

1. (b)
2. (e)
3. (g)
4. (d)
5. (a)
6. (f)
7. (c)

Exercise 2

(a) inclined plane
(b) lever
(c) wheel and axle
(d) pulley
(e) screw
(f) wedge
(g) gear

Exercise 3

1. 4
2. 5
3. 3
4. 2

Exercise 4

1. pulley or inclined plane
2. lever (scissors)

Note: student might suggest a wedge if he or she used a knife.

3. wheel and axle
4. pulley
5. wedge (ax)

MICROFILMED FROM
BEST AVAILABLE COPY

BEST COPY AVAILABLE